This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
2 45 0445 1442

610.41
S982
1853

PRESENTED TO

The New York Academy of Medicine.

By

The Society of the New York Hospital,

March, 1898.

TRANSFERRED TO LANE
LIBRARY FROM ANATOMY

NFORD

THE

SYDENHAM SOCIETY

INSTITUTED

MDCCCXLIII.

LONDON

MDCCCLIII.

THE PROPERTY OF THE HOSPITAL

A MANUAL

OF THE

NERVOUS DISEASES OF MAN.

BY

MORITZ HEINRICH ROMBERG, M.D.

PROFESSOR OF MEDICINE AT THE UNIVERSITY OF BERLIN,
ETC. ETC. ETC.

TRANSLATED AND EDITED

BY

EDWARD H. SIEVEKING, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
ASSISTANT-PHYSICIAN TO ST. MARY'S HOSPITAL, &C. &C.

VOLUME I.

LONDON:
PRINTED FOR THE SYDENHAM SOCIETY.
MDCCCLIII.

[illegible]

C. AND J. ADLARD, PRINTERS,
BARTHOLOMEW CLOSE.

TO HIS EXCELLENCY

ALEXANDER VON HUMBOLDT,

ON THE OCCASION OF

THE FIFTIETH ANNIVERSARY

OF

HIS EXPERIMENTS ON THE IRRITATION

OF THE

MUSCULAR AND NERVOUS FIBRE,

This Volume

IS INSCRIBED, WITH PROFOUND ADMIRATION,

BY

MORITZ H. ROMBERG.

structed, than by the following statement of the opportunities which have been offered to him for inquiry. It is an extract from a letter written by Dr. Romberg himself:

"In 1817, after having completed my studies in Berlin under Professors Rudolphi, Hufeland and Horn, and in Vienna, where I enjoyed the intimacy of Peter Frank and Hildenbrandt, I already selected the study of the diseases of the nervous system for the object of my life and the goal of my researches. It was in the writings of English authors that I found instruction. I at that time translated and edited with annotations, Marshall's 'Anatomy of the Brain in Mania.' I availed myself of the opportunities afforded in our large hospital, la Charité, of examining all the patients labouring under cerebral disease, and the results I obtained I published thirty years ago in the various medical periodicals of Horn, Nasse, and others. The researches of Sir Charles Bell filled me with enthusiasm, and in 1831 I translated his great work, and made known to my professional brethren in Germany his investigations, which will ever serve as models of scientific inquiry. I had extensive opportunities of examining patients during life and after death. For twenty-eight years I was physician to one of the largest unions in Berlin, in which, on an average, 2000 patients presented themselves annually; among these were a large number of nervous patients, most of whom I presented to my pupils in the lectures which I have delivered in the University since 1834. Some of the results of these investigations have been laid down in my academical Essays, (Neuralgiæ Nervi Quinti Specimen, De Paralysi Respiratoria, De Hæmorrhagia Cerebri.) In 1840 I was appointed director of the clinical wards of the University, which had formerly been under the superintendence of Hufeland. From 1500 to 2000 patients apply there annually, and among them there are many nervous patients. Two volumes of clinical results and observations bear testimony to this fact. In addition to this, I have to mention the circumstance of my enjoying an extensive private practice, in which the most interesting cases of nervous disease are brought to my cognizance.—I should not omit to state, that during the first three epidemics of cholera, the largest hospital in Berlin was intrusted to my superintendence, and that I have published the results of my observations in notes attached to a translation of Scott's 'Report of the Madr Presidency,' and in papers of my own in Hufeland's 'Journal and in Casper's 'Wochenschrift.'"

The above contains sufficient proof of the estimation in whic Dr. Romberg is held in his own country. The following respo sible appointments, which he now holds, further show that h merits are duly estimated by his government: he is Regi Professor of the University of Berlin, Director of the Policl nique of the University, and Member of the Supreme Court Examiners, in which capacity he examines all the physicia who settle in the Prussian dominions at the Charité. As matter of course, he is Knight of a Prussian Order. It is on by untiring industry that even a man of grasping and powerf intellect could fill the duties of these offices, and still reta time and vigour to execute literary work such as that before u the extent of personal inquiry and historical acquirement di played in it, can only be appreciated on perusal.

The present work has already passed through two editions Germany, and a third is being prepared. In the original it is pu lished in one volume, which in the translation would have prov too bulky, so that it has been thought more appropriate to bri it out in two volumes. Together they treat of two great divisio of nervous diseases,—the diseases of Sensibility and those Motility. The second original volume will, as we are inform by Dr. Romberg, treat of the following subjects:—1. T diseases of the mind. 2. The diseases of the nutritive sphe of the nervous system. 3. The diseases of the formative foci the nervous system, inflammation, morbid growths, &c. 4. T comparative pathology; and 5. The general pathology neuroses.

Whether or not the Council of the Sydenham Society m eventually determine to publish the continuation of the wor the subscribers will find the present volumes complete in the selves; a scientific rationale of those diseases in which sensati and motion are exalted or diminished, with the therapeutic pr ceedings which have found favour in the author's eyes.

It remains for me to add, that as far as possible the quot tions of authors have been given from works accessible English readers. I have referred to the English original where Dr. Romberg cites German translations; or whe

It is the more necessary to provide ourselves with such support at a time when shallow dilettantism seems to be usurping the place of rigid scientific inquiry. It is the surest way to guard against an error, which medical inquirers have been more guilty of than other students of natural science, that they have attempted to confound that which is accessible with that which is inaccessible to human research. The doctrine of nervous diseases has ever been peculiarly subject to this species of abuse; I have carefully avoided increasing the unknown range, by adding anything that was untrustworthy. I have been averse to anticipating the reader's judgment, by premising doctrinal considerations, which are but too apt to interfere with an unbiassed analysis of facts; general pathology is the keystone of the arch of which special pathology forms the foundation. This much is necessary to justify my departure from the ordinary construction of manuals.

I have retained the same division of the nervous diseases which I have followed for a series of years in my lectures delivered in the university; it is determined by the attributes of the four nervous levers of the organism; accordingly the subject will be considered under the following four heads: the Neurosis of Sensibility, the Neurosis of Motility, Logo-neurosis, and Tropho-neurosis. The delineations of the individual diseases have been taken from cases observed by myself, whenever this was feasible; they are unsoiled by the dust of tradition. I have been at great pains to exhibit the results obtained by surgical observation and experiment as the prototypes of complicated pathological conditions. It was not a part of my plan to introduce historical and literary disquisitions, although I have never neglected the duty of giving every one his due.

My desire is, that practitioners, who are able to dispense with an accumulation of formulæ, may derive benefit from the following investigations. But it is my ardent hope, that this book may be found by students of medicine, not only a source of instruction, but that it may stimulate them to inquiry, in order that fresh forces may be brought to bear on the great aim which we must seek to achieve, *the emancipation of medical science from the trammels of mere mechanical technicalities.*

BERLIN; *September*, 1840.

PREFACE

TO THE

SECOND EDITION.

March, 1851.

THE hope expressed in the Preface to the former edition, has been only partly fulfilled. The majority of students have been attracted by the school which seeks to base the science of medicine exclusively upon pathological anatomy and chemistry. This has given rise to new errors, as the doctrine of the crases most clearly shows. The study of nervous diseases, which some persons have refused to acknowledge as anything but the manifestation of other morbid processes, has been declared a fruitless research, and in some schools has been almost interdicted. If this was the case in the universities, matters were necessarily in a worse condition in daily life. Practitioners chased an illusion and caricature, called spinal irritation, with which they satisfied their craving for explanation, and condensed neuropathology into a space which could be covered with the tip of a finger. To guard against greater debasement, we must enter anew upon the path which the master-mind of Charles Bell, the Harvey of our century, has opened to us.

Let our guide be the analysis of observation, not the cavilling spirit which even attacks the solid basis of physiological laws, such as the law of eccentrical phenomena, or the law prohibiting one nerve from acting for another,—but that purifying criticism which lays bare defects, and mercilessly eradicates fallacies and untruths. He who is rigorous against his own delinquencies, may be permitted to expect the same of others; I still fear not to have sufficiently watched over myself.

It is the more necessary to provide ourselves with such support at a time when shallow dilettantism seems to be usurping the place of rigid scientific inquiry. It is the surest way to guard against an error, which medical inquirers have been more guilty of than other students of natural science, that they have attempted to confound that which is accessible with that which is inaccessible to human research. The doctrine of nervous diseases has ever been peculiarly subject to this species of abuse; I have carefully avoided increasing the unknown range, by adding anything that was untrustworthy. I have been averse to anticipating the reader's judgment, by premising doctrinal considerations, which are but too apt to interfere with an unbiassed analysis of facts; general pathology is the keystone of the arch of which special pathology forms the foundation. This much is necessary to justify my departure from the ordinary construction of manuals.

I have retained the same division of the nervous diseases which I have followed for a series of years in my lectures delivered in the university; it is determined by the attributes of the four nervous levers of the organism; accordingly the subject will be considered under the following four heads: the Neurosis of Sensibility, the Neurosis of Motility, Logo-neurosis, and Tropho-neurosis. The delineations of the individual diseases have been taken from cases observed by myself, whenever this was feasible; they are unsoiled by the dust of tradition. I have been at great pains to exhibit the results obtained by surgical observation and experiment as the prototypes of complicated pathological conditions. It was not a part of my plan to introduce historical and literary disquisitions, although I have never neglected the duty of giving every one his due.

My desire is, that practitioners, who are able to dispense with an accumulation of formulæ, may derive benefit from the following investigations. But it is my ardent hope, that this book may be found by students of medicine, not only a source of instruction, but that it may stimulate them to inquiry, in order that fresh forces may be brought to bear on the great aim which we must seek to achieve, *the emancipation of medical science from the trammels of mere mechanical technicalities.*

BERLIN; *September*, 1840.

PREFACE

TO THE

SECOND EDITION.

March, 1851.

THE hope expressed in the Preface to the former edition, has been only partly fulfilled. The majority of students have been attracted by the school which seeks to base the science of medicine exclusively upon pathological anatomy and chemistry. This has given rise to new errors, as the doctrine of the crases most clearly shows. The study of nervous diseases, which some persons have refused to acknowledge as anything but the manifestation of other morbid processes, has been declared a fruitless research, and in some schools has been almost interdicted. If this was the case in the universities, matters were necessarily in a worse condition in daily life. Practitioners chased an illusion and caricature, called spinal irritation, with which they satisfied their craving for explanation, and condensed neuropathology into a space which could be covered with the tip of a finger. To guard against greater debasement, we must enter anew upon the path which the master-mind of Charles Bell, the Harvey of our century, has opened to us.

Let our guide be the analysis of observation, not the cavilling spirit which even attacks the solid basis of physiological laws, such as the law of eccentrical phenomena, or the law prohibiting one nerve from acting for another,—but that purifying criticism which lays bare defects, and mercilessly eradicates fallacies and untruths. He who is rigorous against his own delinquencies, may be permitted to expect the same of others; I still fear not to have sufficiently watched over myself.

CONTENTS.

CLASS I.

NEUROSES OF SENSIBILITY.

		PAGE
CHAPTER	I.—Neuroses of Sensibility	1
„	II.—Hyperæsthesiæ	6
„	III.—Hyperæsthesia of the Cutaneous Nerve	18
„	IV.—Neuralgia of the Fifth Pair	31
„	V.—Ciliary Neuralgia	56
„	VI.—Neuralgia of the Lumbo-sacral Plexus	59
„	VII.—Neuralgia of the Brachial Plexus	80
„	VIII.—Pruritus—Formicatio	86
„	IX.—Hyperæsthesia of the Nerves of Muscular Sense	91
„	X.—Hyperæsthesia of the Vagus	103
„	XI.—Hyperæsthesiæ of the Nerves of the Organs of Sense	110
„	XII.—Hyperæsthesia of the Sympathetic Tracts	123
„	XIII.—Hyperæsthesia of the Hypogastric Plexus	142
„	XIV.—Hyperæsthesia of the Spermatic Plexus	144
„	XV.—Hyperæsthesia of the Spinal Cord and the Brain	148
„	XVI.—Hyperæsthesia of the Brain	158
„	XVII.—Neuralgia Cerebralis	176
„	XVIII.—Anæsthesiæ	192
„	XIX.—Anæsthesia of the Cutaneous Nerves	200
„	XX.—Anæsthesia of the Fifth Pair	211
„	XXI.—Anæsthesia of the Muscular Nerves	225
„	XXII.—Anæsthesia of the Vagus	228

PAGE
CHAPTER XXIII.—Anæsthesia of the Nerves of Special Sense . . 232
" XXIV.—Acoustic Anæsthesia 244
" XXV.—Anæsthesia Olfactoria 249
" XXVI.—Anæsthesia Gustatoria 252
" XXVII.—Anæsthesia of the Sympathetic Ganglia and their Nerves . 264
" XXVIII.—Anæsthesia of the Spinal Cord . . . 265
" XXIX.—Anæsthesia of the Brain 272

CLASS II.

NEUROSES OF MOTILITY.

CHAPTER I.—Neuroses of Motility 275
" II.—Hypercineses 279
" III.—Spasms in the Range of the Facial Nerve . . 290
" IV.—Spasm in the Muscles, supplied by the Portio Minor of the Fifth Pair 299
" V.—Spasm in the Range of the Nerves of the Eye, the Oculomotor, the Trochlear, and the Abducens . . 306
" VI.—Spasm in the Range of the Hypoglossus . . 314
" VII.—Spasm in the Muscular Distribution of the Nervus Accessorius Willisii, and of the Superior Cervical Nerve . 316
" VIII.—Spasm in the Range of the Motor Nerves of the Upper Extremities 320
" IX.—Spasm in the Range of the Motor Nerves of the Inferior Extremities 325
" X.—Spasm in the Range of the Nerves controlling the Movements of Respiration and Vocalisation . . 330
" XI.—Spasmus Bronchialis 337
" XII.—Inspiratory Convulsions 342
" XIII.—Expiratory Convulsions 347
" XIV.—Vocal Spasms 362

DISEASES OF THE NERVOUS SYSTEM.

CLASS I.

NEUROSES OF SENSIBILITY.

CHAPTER I.

THAT vital process by which an abnormal variation in the excitability of the centripetal nerves is produced, may be termed a neurosis of sensibility.

The activity of the centripetal nerve is manifested by the aid of the brain, as a conscious sensation; by the intervention of the spinal cord, or ganglionic system, as reflex action; it may be either excessive, when we call it hyperæsthesia, or below the average, when it becomes anæsthesia.

The varieties dependent upon difference of locality may be classed according to these two categories. Sensation differs according to the peculiar activity of the nerve of sensation; the same difference presents itself in the neuroses of sensibility. Whether a cutaneous nerve, or a nerve of sensation supplying a muscle or an organ of sense, be affected, each retains the peculiar sphere of sensibility in disease with which it is endowed in health.

It is also important to distinguish according as to whether the seat of disease be peripheral or central; but in making the distinction, it is necessary that the term peripheral nerve be correctly interpreted, and not confined to the ultimate terminations of the nerves. A nerve must be considered *peripheral* from the point at which it quits the central organ to its extreme distribution. What is called the root of the nerve, or more correctly its point of insertion, is but a portion of the peripheral distribution. By taking this view, the doctrine of the hyperæsthesiæ and the anæsthesiæ obtains a more extensive signification; the mere examination of the superficial nerves cannot, as it has hitherto done, suffice, but it becomes the more imperative to examine the fibres traversing the osseous canals, or passing over the brain and spinal cord, as distinct characters indicate the seat of disease in different divisions of the peripheral tract. The nerve can only be considered *central* within the ganglia, the spinal cord, or the brain, where its fibres are surrounded by ganglionic corpuscles, and are in part merged in them. It is necessary to base the doctrine of the neuroses of sensibility upon the physiological laws governing the nerves of sensation. These are:

First, the law of isolated conduction; that nerve-fibre only presents exalted or diminished action, which is affected by the irritating or depressing cause; and the adjoining fibre, though in ever such close approximation, is not implicated. This law meets with no exception in the peripheral tracts. In regard to the central organs we must also adopt,

Secondly, the law of the sympathy or irradiation of sensations; here the irritation is propagated from the fibre originally excited to other centripetal nerves.

Thirdly, the law of eccentric phenomena; every sensation, as it becomes perceptible to consciousness, is referred to the periphery of the sensitive fibre, the entire tract of which, from its commencement to its terminal point, is susceptible of the impression. It is to be regretted that surgical operations have not been rendered more available for the determination of physiological questions in the manner adopted by Sir C. Bell. They are peculiarly adapted to the illustration of these laws, because, viewed as experiments, and being performed in the majority of instances upon individuals in a fair state of health, they afford clear and trustworthy results. The following case, which occurred in 1846, in the wards of my esteemed friend, Professor Jüngken, and which was taken down at my request by my former pupil, Dr. Marcus, may serve as an illustration of the law of eccentricity.

distribution. What is called the root of the nerve, or more correctly its point of insertion, is but a portion of the peripheral distribution. By taking this view, the doctrine of the hyperæsthesiæ and the anæsthesiæ obtains a more extensive signification; the mere examination of the superficial nerves cannot, as it has hitherto done, suffice, but it becomes the more imperative to examine the fibres traversing the osseous canals, or passing over the brain and spinal cord, as distinct characters indicate the seat of disease in different divisions of the peripheral tract. The nerve can only be considered *central* within the ganglia, the spinal cord, or the brain, where its fibres are surrounded by ganglionic corpuscles, and are in part merged in them. It is necessary to base the doctrine of the neuroses of sensibility upon the physiological laws governing the nerves of sensation. These are:

First, the law of isolated conduction; that nerve-fibre only presents exalted or diminished action, which is affected by the irritating or depressing cause; and the adjoining fibre, though in ever such close approximation, is not implicated. This law meets with no exception in the peripheral tracts. In regard to the central organs we must also adopt,

Secondly, the law of the sympathy or irradiation of sensations; here the irritation is propagated from the fibre originally excited to other centripetal nerves.

Thirdly, the law of eccentric phenomena; every sensation, as it becomes perceptible to consciousness, is referred to the periphery of the sensitive fibre, the entire tract of which, from its commencement to its terminal point, is susceptible of the impression. It is to be regretted that surgical operations have not been rendered more available for the determination of physiological questions in the manner adopted by Sir C. Bell. They are peculiarly adapted to the illustration of these laws, because, viewed as experiments, and being performed in the majority of instances upon individuals in a fair state of health, they afford clear and trustworthy results. The following case, which occurred in 1846, in the wards of my esteemed friend, Professor Jüngken, and which was taken down at my request by my former pupil, Dr. Marcus, may serve as an illustration of the law of eccentricity.

A labouring man, aged 33, of robust constitution, was affected by an aneurysm of the popliteal artery, brought on by carrying heavy loads up a ladder. It was at first of the size of a bean, and accompanied by lacerating pains, but in consequence of maltreatment by stimulant embrocations, it increased, within three weeks, to the size of a fist; the pains at the same time became agonising, but were invariably interrupted by applying pressure to the femoral artery. The vessel was tied according to Hunter's method. After the operation no difference was perceptible in the limb, though pulsation had entirely ceased. For two hours the temperature, the motion, and sensation of the limb remained unaltered, and the pains had entirely ceased. The warmth of the extremity then gradually disappeared, from the toes upwards; the patient complained of a sense of formication and numbness in the foot, and especially in the toes, and of very violent pains darting periodically through the sole. These ceased on the removal of the compress that had been applied to the tumour, but returned with renewed violence on accidentally pressing the aneurysm at the point traversed by the popliteal nerve; the patient screamed loudly, "my toes!" and involuntarily moved the foot. The pressure was intentionally repeated several times, and invariably followed by the same phenomena. Seven hours after the operation, the foot felt cold up to the ankles, was somewhat damp, and entirely insensitive to external impressions, by pricking or pinching. The patient averred, that he could not possibly move the foot, though when requested to make the attempt, he was able to extend and flex his toes; when he did so, he inquired whether he was moving the foot, which he was unable to see, and repeated the assurance that he was perfectly unconscious of doing so. Burning pains recurred from time to time during the night, in the sole of the foot. On the succeeding day a sense of deadness was manifested in the leg as far as the knee; the wound, and the parts above the knee, were painful. The movement of the toes was facilitated by directing the attention to them, and especially if the toes of the opposite foot were moved at the same time; the patient was not, however, conscious of the movement on the affected side. This condition remained unaltered on the second day after the application of the ligature, except that strong

CHAPTER II.

HYPERÆSTHESIÆ.

The character which these affections have in common, is exalted irritability and increased irritation of the sensitive or centripetal nerves. The expression of this irritation is either psychical, one of consciousness, a sensation,—or motor, a reflex movement, or both at the same time.

The sensation varies according to the peculiar sphere of the affected nerve. Hyperæsthesia of the cutaneous nerves is manifested by pain in its various modifications; that of the nerves of special sense by phantasms. The part taken by the brain as the psychical organ, in sensation, is not only receptive, but also reactive. If the imagination dwells upon the sensation, the latter becomes more intense and more defined; the power of imagination may create sensations, as proved by the feeling of nausea or prurigo, and a morbid condition termed hypochondriasis. Dreaming and insanity differ from unfettered consciousness, in their interpretation of centripetal action, by an absence or estrangement of self in the perception of sensations: evidence of this is presented to us in nightmare and hallucinations.

The second manifestation of exalted irritability of the centripetal nerve takes place by reflex action upon the motor apparatus, in which case sensation may be absent or it may continue. In the former case, the absence of accompanying sensation increases the difficulty of forming a correct judgment; but we may satisfy ourselves of the real character of the affection by observing that the gentlest irritation of centripetal nerves, which in ordinary conditions would produce no effect, at once rouses reaction amounting to violent spasmodic action, such as we see in poisoning by strychnine, in tetanus, or hydrophobia. The combination of sensation and reflex action, as often exhibited in hyperæsthesiæ, of the cerebro-spinal, and more particularly in the sympathetic system, allows of a more has made the observation that as much as 15 to 30 seconds may elapse before a sensation is excited, and that in some patients the impression must be several times repeated before it can be perceived. The period might be determined with greater accuracy by employing a toothed wheel making a certain number of revolutions in a second (say 50 or 100), and by comparing the number of impulses required to produce isolated impressions in healthy and in diseased parts. In such experiments, consciousness must be in a state of perfect integrity.

easy interpretation. Thus, in ciliary neuralgia or photophobia, the eyelids are closed by reflex action, communicated by the sensitive fibres of the trigeminus to the motor fibres of the facial nerve. In sciatica, pain occurs in combination with cramps in the calves and spasmodic action of the leg. In the case of prosopalgia with neuralgia of the tongue, which will be detailed in a future chapter, reflex action was communicated to the hypoglossus, and in consequence of this the tongue was thrown about. Numerous instances present themselves, in connection with hyperæsthesiæ of the sympathetic. Under this head we class disturbance of the rhythm of the heart's action from cardiac neuralgia, intestinal spasm, and ischuria accompanying mesenteric neuralgia. Nor is it only in the muscular tissue that hyperæsthesia is manifested by reflex action; the same is the case in other contractile tissues: but it is a subject to which hitherto little attention has been devoted. Thus it may show itself in the skin; for it is not unusual for the hair in hemicrania to be elevated at certain painful parts. A further relation between hyperæsthesia and motor action is exhibited in the aura epileptica; phantasms, vertigo, and especially abnormal sensations of a current of air, or more frequently of tearing, dragging pains, which mount up from some point of the trunk or the extremities to the head or the adjoining parts, where they seem to be cut off, and are immediately followed by spasms. Epileptic attacks most frequently, and not unfrequently hysterical paroxysms, are introduced in this manner. Even tetanic and hydrophobic spasm occasionally commences with an aura at the seat of injury.

In hyperæsthesia we find that not only the irritation is increased, but that also the irritability of the nerves of sensation generally is exalted, both during the paroxysms as well as in the intervals. During the paroxysms it shows itself by the extent of the sympathetic action, such as takes place, for instance, in the hyperæsthesiæ of the sympathetic system and in hysterical affections. In the intervals it manifests itself partly by a derangement of sensibility, as in tenderness or numbness of the neuralgic parts, partly by the abnormal reaction to external stimuli, or to irritation proceeding from the organism. Thus, neuralgic patients exhibit an unusual sensitiveness to atmospheric influences of an electric or hygrometric character, whose approach they are thus able to foretell. Hugh Ley[1] has made the observation that leechbites induce erythema and ulcers in the skin of neuralgic subjects. We may also quote, in proof of our position, the trifling nature of the cause which occasionally gives rise to the paroxysms, and the contrast in the effects produced by these causes in different individuals. It is this exalted sensibility, upon which the change in the relations of the organism in hyperæsthesia depends, that distinguishes morbid processes from mere physiological activity of a stimulated nerve. Our acquaintance with these phenomena is not as yet sufficiently extensive; but their study will be advanced by accurate observations of the free intervals occurring between the paroxysms.

If we turn from the physiological to the nosological features of hyperæsthesia, we observe that the following characters are applicable to the entire class: 1. Periodicity, the alternation of paroxysms and intermissions. 2. Uniformity and persistence of the symptoms, however long the duration of the disease. 3. Absence of danger to life. 4. Freedom of early life from the disease.

We know little of the anatomical characters of hyperæsthesiæ; nor can it be expected, as these affections rarely end fatally, and an opportunity for a post-mortem examination seldom presents itself. We must also remember that the law of eccentricity was formerly unknown, and that the seat and cause of the disease were only sought for in the superficial ramifications; the pathologist not meeting with palpable changes, was contented to seize upon cadaveric infiltration of the nerves with blood or serum, as a morbid change. Besides it demands extreme care in the investigation, as well as more enduring devotion to this subject than is usually met with, to discover microscopic alterations, or even to find a tubercular deposit of the size of a millet seed in the fibres of a nerve of sensation.

The etiology of hyperæsthesia has only been imperfectly ascertained. As regards age, the middle period of life presents the greatest predisposition, and old age very little, whilst childhood is entirely exempt. The two sexes have each a separate proclivity to certain forms; the male sex is exclusively subject to hypochondriasis, whilst females are mainly liable to hemicrania, intercostal neuralgia, and mastodynia neuralgica. Little hereditary predisposition exists, except in regard to hemicrania. Atmosphere and soil have a marked influence. An epidemic occurrence of acute forms of neuralgia, with a definite type, has been repeatedly observed of late. An increase in their frequency is often noticed when intermittent forms prevail: thus, malarious districts are fertile in neuralgic complaints. The influence of climate has not as yet been determined. Atmospheric changes, wind, storm, thunder and lightening, continued heat or cold, all are exciting causes. Some substances appear to have a specific effect in producing hyperæsthesia: thus lead causes neuralgia, spurred rye and veratrine produce formication, morphia gives rise to pruritus, and the inhalation of protoxide of nitrogen to optical hyperæsthesia. Of the causes seated in the organism itself, the blood plays the most important part. Plethora as well as anæmia are followed by vertigo, optical and acoustic hyperæsthesia. Anæmia, especially in the female sex, is the most frequent basis of hyperæsthesia; it seems as if pain were the prayer of the nerve for healthy blood. Congestion of the brain from hypertrophy of the left ventricle induces vertigo, and optical and acoustic illusions. Obstruction or cessation of habitual hæmorrhages, especially of the catamenia, is a frequent cause of hyperæsthesia. Matters secreted from the blood may also give rise to this class of affections. The attention of the older physicians was almost exclusively directed to the secretions of the skin, the liver, and the intestinal glands; recently we have become acquainted with the relation of the renal secretion to nervous diseases in general, and we have learnt the influence exerted by the elimination of oxalate of lime and the phosphates upon spinal neuralgia and hypochondriasis. Among the diseases predisposing to hyperæsthesia, hysteria occupies the first rank; rheumatism, gout, hæmorrhoids, carcinoma, impetiginous affections, whether undeveloped or evolved, or interrupted, are frequently at the bottom of the evil. The changes produced by these and other pathological states, such as syphilis and scrofula, though mere residues of an extinct process, may maintain the hyperæsthesia; swellings of osseous and cartilaginous tissues, through which nerves of sensation take their course, may act in this way, and give rise to actual incarceration. Dilatation of the vessels accompanying sensory nerves in their passage through cranial or intervertebral apertures produces a similar effect, as well as distension and repletion of hollow organs, as in the production of neuralgia of the lower extremities by accumulation in the colon.

---

[1] An Essay on Laryngismus Stridulus or Croup-like Inspiration of Infants. London, 1836, p. 306.

An especial mention must be made of tumours attached to the nerves themselves. This leads to the question, how increased action of the nerve of sensation is induced by pressure. It can only be if, at the same time, there is irritation and traction of the fibres; consequently, it is much more frequent in interstitial tumours, though their bulk be ever so small, as in painful tubercle, than in large neuromatous growths, over which the sensitive fibres may be spread fanlike, and be stretched to the utmost without marked derangement. I have raised and stretched the thick infra- and supra-orbital nerve of horses on the handle of a scalpel, like a string on the bridge of a violin, without exciting the least evidence of sensation; but as soon as mechanical or chemical irritation had given rise to inflammation of the nerve, a gentle touch caused violent pain. Compression of a healthy nerve of sensation, by the tumefaction of adjacent parts, interrupts conduction and induces anæsthesia. If the same nerve becomes inflamed or ulcerated, pressure causes severe pain, as we occasionally see in aneurysms; of this Morgagni[1] gives an illustrative instance.

Knowing as little as we do of the causation, it would be of no use to construct an etiological diagnosis, and, for instance, to determine, as has been attempted, the character of the neuralgia from the character of the pain. Observers have not been sufficiently discriminating even in this matter; for irritation of healthy nerves and sympathetic sensations have been misinterpreted as evidence of hyperæsthesia. For the same reason we are not justified in adopting a classification based upon etiological relations; for the alleged practical utility of such a system is destroyed by its utter untrustworthiness. We must take our nosological principles, if they are to be tenable, from the laws of physiology; it is only thus that they can attain permanence and perfection. The range of these diseases in this way obtains a different and larger extent than presented by former systems. The divisions of the following arrangement are adopted according to whether the irritation affects the peripheral tracts of the nerves or the central apparatus, or according to the peculiar action of the sensitive nerve. We propose to treat of the conscious hyperæsthesiæ, of those which present an expression of sensation, in this section. Those which the individual remains unconscious of, and are manifested by motor reflex action, will be placed among the neuroses of mobility.

---

[1] De sedibus et causis morb.; epist. i, art. 55.

First Order. — Hyperæsthesiæ from Irritation of the Nerves.

The physiological criterion of peripheral hyperæsthesiæ lies in the rule of isolated conduction on the side of the injury.

1. Cutaneous hyperæsthesiæ. Neuralgia. Pruritus. Ardor.
2. Muscular hyperæsthesiæ. Neuralgia muscularis. Vertigo.
3. Hyperæsthesiæ of the vagus. Gastrodynia neuralgica. Bulimia. Polydipsia.
4. Hyperæsthesiæ of the special senses. Hyperæsthesia optica, acustica, olfactoria, gustatoria.

Second Order.—Hyperæsthesiæ from Irritation of the Central Organs.

The physiological character of these affections is marked by communicability and translation of the conditions of irritation to other sensitive and motor fibres. This serves to distinguish the sympathetic ganglia from the ganglia of the spinal cord, the ganglion of the fifth pair, and the ganglion of the vagus.

1. Hyperæsthesiæ of the sympathetic ganglia.
    - *a.* Hyperæsthesia of the cardiac plexus.
    - *b.* " " solar plexus.
    - *c.* " " mesenteric plexus.
    - *d.* " " hypogastric plexus.
    - *e.* " " spermatic plexus.
2. Hyperæsthesiæ of the spinal cord. Spinal neuralgia.
3. Hyperæsthesiæ of the brain; conduction takes place in a crucial direction, *i. e.*, the phenomena are manifested on the side opposite to the seat of injury. Cerebral neuralgia. Psychical hyperæsthesiæ.

Hyperæsthesia generally runs a chronic course. Many of its forms grow old with the individual affected. They are marked by a periodic character, an alternation of paroxysms with longer or shorter intervals, and they have a uniform or varying type. They rarely terminate in complete recovery; slight derangements of sensibility and a tendency to relapse continue for a long time. They may pass into morbid conditions of the same, or of other parts of the nervous system. Thus, peripheral neuralgic affections, especially when originating in traumatic causes, gradually extend their range by implication of the central organs; and what at first was mere sympathy is thus converted into a positive neuralgic disease. Irritation of nerves of sensation by foreign bodies, morbid growths, or dragging cicatrices, occasionally induce epilepsy. Hyperæsthesiæ of the nerves of sense, especially of the optic nerve, may be followed by insanity.

We do not possess positive proof of the transition of hyperæsthesia to organic derangement; still it may be assumed with much probability to take place. Even during the neuralgic paroxysm, certain phenomena in the circulation and secretion are known to occur. Thus the paroxysms of facial neuralgia are accompanied by flushing, heat, secretion of tears, or saliva, and increased pulsation of neighbouring arterial trunks. Earle,[1] to whom we are indebted for instructive observations, in a case of supra-orbital neuralgia, saw a well-defined red streak in the course of the nerve developing so much heat, that cold applications rapidly evaporated. In the case of a widow, who for years had been affected with neuralgia of the inferior maxillary branch of the fifth pair, every paroxysm was accompanied by violent pulsation in all branches of the superficial carotid, and generally terminated with a profuse discharge of saliva. In neuralgia of the ciliary nerve the eye weeps and becomes red. Intermittent ophthalmia, frequently, is nothing but congestion of the conjunctiva accompanying an intermittent neuralgia of the first branch of the fifth pair. In the case of Mr. F—, of which the details are given in the chapter on Facial Neuralgia (p. 37), whenever the ophthalmic nerve was affected, the eye became bloodshot during the paroxysms, and remained so for some time after, as in severe traumatic ophthalmia; the eye became prominent, and there was tumefaction of the eyelids and copious secretion of tears. Erythema and vesication often accompany punctures of sensitive nerves. I have related a case of the kind myself, and the following may be quoted from Earle's observations. A female, æt. 32, pricked the external cutaneous nerve with a fork about the middle of the forearm. Violent pains ensued in the course of the nerve, followed by considerable inflammation in the vicinity of the wound. Three weeks after the occurrence, the patient while moving the arm, was suddenly seized with violent pains and a burning sensation in the wound. An erysipelatous redness extended over the anterior surface of the forearm, and large blisters formed as in pemphigus. The heat of the arm was very considerable. Perfect quiet and opiate fomentations rapidly restored her; but soon after, on making a renewed attempt to move the arm, the paroxysms returned. The temperature of the arm was three degrees higher than it was under the tongue. The relapse occurred four times from the same cause,—during the last attack, there were no vesications, but there was an eruption resembling urticaria. We shall have occasion to allude to the relations between herpes zoster and neuralgia; its prevailing occurrence on one half of the body, in the course of the intercostal or lumbar nerves, removes it out of the pale of the law of symmetry governing the exanthems. Frequent repetition and permanence of hyperæsthesiæ influence organic formation, and give rise to structural changes. Thus in the further progress of the case of facial neuralgia already alluded to, salivation continued even in the intervals, whilst at the commencement it only occurred during the paroxysms. Neuralgia of the cœliac ganglia often precedes the development of carcinoma of the stomach by many years. In psychical hyperæsthesia the accession of material changes is a matter of pathological and therapeutic importance.

---

[1] Medico-Chirurg. Transact., vol. vii, p. 187.

A fatal termination is, as we have already remarked, quite exceptional.

The prognosis, though favorable to the duration of life, is unsatisfactory as to the curability of the affection; few diseases are more obstinate than hyperæsthesiæ, and they are very prone to recur. The intermissions which occasionally take place are so long as to cause an appearance of recovery. When the seat of disease is in the peripheral parts, the prospect is more favorable than when the central organs are affected. Intensity and long-continuance of the pains operate injuriously upon nutrition and the general state of health.

The spontaneous cure of hyperæsthesia takes place at times by the aid of critical discharges; neuralgia of the cœliac ganglia may disappear on the occurrence of hæmatemesis and melæna, sciatica or hypogastric neuralgia, with an hæmorrhoidal or uterine hæmorrhage; vertigo may yield to an attack of epistaxis; or similar effects may be produced by metastasis, by means of a paroxysm of gout, or an impetiginous eruption. Hyperæsthesia may also disappear without marked crises or changes—thus hemicrania ceases in advanced age.

The first point to be considered in treatment is the predisposing or exciting cause; but it is rare, and then only when the disease is recent, that the removal of the cause prevents the effects, as in the case of extirpation of neuromata for the relief of neuralgia, of change of occupation in lead colic, change of residence in malarious neuralgiæ. It is generally difficult, and often impossible, to overcome the morbid processes upon which the hyperæsthesiæ are based; and even success in this point does not always achieve the desired object. The change in the irritability of the nerve originating in the sympathetic affection of the cerebral organs generally remains, and renders other modes of treatment necessary; to which we are often obliged to have recourse from the beginning, when, as is too often the case, we are unable to ascertain the cause. An immediate attack upon the nerve suggests itself in the first instance; this has been attempted in a direct manner by division of the nerve in neuralgia, but from ignorance of the law of eccentric phenomena it has generally been ineffective, and has only been satisfactory when the seat of disease was peripheral, as in the case of injury or tumours. Subsequently, acupuncture and electropuncture of the affected nerve were introduced, though without permanent results. Magnetism and electricity by induction were then employed, and again given up. The patient finds some relief in compression, but its benefits are of short duration. Veratrine and aconitine have obtained a reputation as anæsthetic agents, and when rubbed into the neuralgic part in the shape of an ointment, they frequently afford relief. These and similar means were calculated to operate upon the peripheral tract and the conducting power of the nerve; other attempts were made with the view of suppressing the part taken in hyperæsthesia by the brain, and preventing the consciousness of the sensation. This view is realised by the employment of narcotics, among which opium, and especially morphia, used both internally and endermatically, deserves the preference. During late years we have become acquainted with the inhalation of ether and chloroform as an agent by which the conduction of sensation is weakened and extinguished, and with rare exceptions consciousness is placed in abeyance. The effect, however, like that of morphia, is evanescent and insufficient to prevent the return of paroxysms; it can therefore only serve as a palliative. The co-operation of the brain as the organ of the soul may be called into play in another respect, in the treatment of hyperæsthesia. We have already alluded to the influence of the mind being directed to the sensation; the change in the direction of the attention becomes a question of therapeutic value. We cannot in every patient expect to find the same strength of resolution which the great philosopher of Königsberg, Kant, praised as a remedy against pain, but we may induce salutary changes by exciting new emotions and by transferring attention to the motor powers; thus it may be highly useful to promote voluntary and even laborious movements, even when counter-indicated by the pain; the result will be the more satisfactory if the cause of the hyperæsthesia lies in the brain, as we shall have occasion to see more fully when we treat of hypochondriasis.

This mode of treatment rarely suffices by itself; we must then look for our indications in the relations of the nerves to other organs. This may be found in the vascular systems and the blood, which often play an important part in these affections. Not only are the nerves dependent upon them for nutrition and regeneration, but we may assume that the pulsations of the vessels exert a considerable influence upon the nervous agency, both on account of the vicinity of the nerves and vessels to one another, and of the peculiar apposition of the arteries to the nerves obtaining in many instances; the rhythmical action thus communicated may be looked upon as a substitute for independent motion of the nerves. The result of applying ligatures to arteries, and of the impermeability of arteries from inflammation or other causes, are evidences in favour of this view; as long as no collateral circulation has been established, anæsthesia is observed in various degrees. Upon these grounds the temporary compression of arteries adjoining the seat of disease may be beneficially applied both during a paroxysm as well as in the intervals; the crural and popliteal arteries may be compressed in sciatica; the temporal in neuralgia of the ophthalmic branch; the carotids in tic-douloureux, vertigo, or tinnitus aurium. Abstraction of blood locally, though not indicated by plethora, has a similar effect, but it is rarely useful except at the commencement of disease; while in the later stages it is calculated to render the paroxysms more frequent and more violent. We obtain a more salutary and more enduring result, especially in inveterate cases, by an agent that operates powerfully upon the blood,—this is iron; its value is undeniable, even in patients who show no symptoms of anæmia.

The continued use of this remedy not unfrequently eradicates entirely the great excitability, by which not only the hyperæsthesia is maintained, but even its transition to other nervous affections promoted. It is necessary to adapt the remedy to the individual patient. Thus, the chalybeate waters, the carbonate of iron, the muriate, or iodide, or the tinctures of iron, may each be more especially indicated in certain cases; and with the administration of these remedies internally the use of baths may be appropriately combined. We possess a powerful agent, which necessarily affects nerves and blood-vessels equally in heat; it is most useful in peripheral neuralgiæ. Thermal baths are peculiarly beneficial in this respect; and they act the more effectually if, at the same time, they affect the cause; thus sulphurous baths are extremely valuable in lead affections. Wiesbaden, Teplitz, Warmbrunn, Landeck, &c., are efficient in hæmorrhoidal, rheumatic, or arthritic constitutions, in which, as modern observations have shown, salt baths are also to be recommended. Artificial baths afford a substitute, though an imperfect one, for the natural waters. In central hyperæsthesiæ the abstraction of warmth is advisable; cold applications to the head, in the shape of washing or affusion, are commendable for vertigo and psychical hyperæsthesia. To the last-named affection the cold water cure is also generally applicable.

The antagonistic method, which acts by means of derivation and translation, is proved to be effectual, both by ancient and modern experience. It produces its effects by the irritation of other nerves; thus, in hyperæsthesia of the nerves of the senses, we give nauseating medicines, by which we influence the nerves of the stomach; or we seek to increase the action of secreting surfaces, and give purgatives to operate upon the bowels, we employ vapour baths to promote the action of the skin, and diuretics to stimulate the kidneys; or we establish issues to produce fresh discharges.

However much labour and trouble we may expend upon this mode of treatment, which is designated the rational system, it often fails, and we are thrown back upon empiric remedies. This is no reproach; for the most trustworthy remedy in intermittent hyperæsthesiæ, the vegetable and mineral antitypics, quinine and arsenic, are no better than empiric. We must, however, exert our critical acumen, be sparing of praise, and mature our observations; there is much in the waste-pan of materia medica which at some time has enjoyed a large reputation. Specific powers have been attributed to turpentine, arsenic, and nitrate of silver. We shall examine the nature of their claims upon our confidence in the following pages.

CHAPTER III.

HYPERÆSTHESIA OF THE CUTANEOUS NERVES.

The expression of this variety of hyperæsthesia consists in a sense of pain, itching, formication, and heat; pain is the most frequent symptom, and for this reason the term *neuralgia* has been used to designate it. These sensations come on in paroxysms, and are confined to the distribution of one or more cutaneous nerves, of one or occasionally of both sides of the body.

Injuries of the nerves may serve as types of this affection, because they may, as surgical operations generally, be looked upon in the light of experiments which afford a more distinct interpretation of simple conditions.

Neuralgia from injury of a nerve may be known by the pain commencing at a definite point in the course of a nerve, by its distribution to the peripheral terminations of the nerve, by excitement or exaltation of the pain by the slightest touch of the injured part, and by cessation of pain when compression is applied above the seat of injury. Sooner or later sympathies in other nerves, not only in the vicinity, but also at a distance from the original seat, show themselves, and if the pain continues for a long time a constitutional disease is developed.

Punctured wounds, cuts, bruises, and foreign bodies are the most frequent causes. The pain occurs in paroxysms, and is produced or increased by change of weather, affections of the mind, and errors in diet.

The purest form of neuralgia is seen when the injury affects very sensitive nerves, such as the subcutaneous nerves; it becomes blended with symptoms of a motor character, when those causes are seated in a nerve containing sensitive and motor fibres.

Cases.—A young lady, aged 16 years, while engaged in acquiring the art of cookery, pricked the middle finger of the right hand, on the radial side between the second and third phalanx. Violent pains ensued at once, and inflammation set in some days after with an eruption of phlyctenæ, accompanied by a dusky redness of the hand and forearm. Suitable remedies removed the inflammation, but a painful sensation remained in the point of the finger, which was increased by contact or spontaneously, and frequently induced sympathetic sensations in the hand, arm, neck, and legs of the same side. Whenever the patient becomes otherwise indisposed, the finger is the most painful part. The repeated use of the sea-baths at Norderney has effected a remission, but no cure. At a later period spasms in the distributions of the facial and accessory nerve of the same side supervened.

Wardrop[1] relates the following case: "A young gentleman received a cut with a gun-flint obliquely across the radial side of the distal phalanx of the left thumb. The wound was about two thirds of an inch in length, and so deep as to divide the digital artery. Though accompanied with an unusual degree of pain, it readily healed by adhesion, and being considered of little importance, no further notice was taken of it. The patient, however, returning to his usual habits, and living rather fully, in a few days the thumb became painful, and the uneasy feelings accompanied by constitutional irritation, had greatly increased when I first saw him, which was on the sixth day after the accident. No change could then be perceived in the appearance of the thumb, and the cicatrix seemed perfectly natural, notwithstanding he complained of great pain, not only in the wounded thumb, but also in the forefinger and radial side of the middle finger, which extended up the arm and as far as the neck and side. The pain was constant, and when the wounded thumb was even slightly touched, it became excessively severe. The pulse was frequent and tense, the face flushed, and the tongue white and frothy. A very copious general bleeding gave almost immediate relief, the pain in the arm and back decreasing, and the thumb becoming less painful to the touch. For three successive days all the local symptoms returned, but yielded each time to a repetition of the bleeding, along with copious purging and a strict antiphlogistic regimen. The paroxysms of pain were several times distinctly produced by mental excitement, and on some occasions were brought on by taking even a very small portion of animal food. Opiates gave little relief, and nothing seemed essentially useful but strong purgatives, and living on the most simple liquid food. Three weeks after the accident he was considerably reduced in flesh and strength, and the primæ viæ, whose functions had long been deranged, were now difficult to regulate. The wounded thumb, which was at all times painful and extremely tender to the touch, was sometimes seized with paroxysms of agonizing pain, which was no longer confined to those fingers supplied by the radial nerve, but extended over the whole hand, arm, neck, and even down to the back. In this alarming state the trial of some further means of relief seemed imperative. I thought it advisable to make a complete division of the nerve above the injured part, and the operation was immediately performed by making a deep transverse incision close to the second point. The operation was instantly followed by a complete abatement of all the symptoms; for the thumb, which he could not allow to be touched a minute before, he could now roughly handle, and all pain left the other fingers and hand. The symptoms, however, did not remain permanent, for during several weeks after the operation, whenever he took food of difficult digestion, when purgatives did not readily operate, or when his mind was at all excited, the pain attacked his hand and arm, and sometimes to a very considerable degree. After that time his health became quite re-established, and twenty months have now elapsed since the operation, during which time he has been able to take the most violent exercise in shooting and hunting. The point of the thumb has always remained numb, though not painful to the touch, and what strongly points out the sympathy which sometimes an injured part long preserves with the digestive organs, is that when from any cause this gentleman's stomach is disordered, he feels a pain in the injured thumb."

---

[1] Medico-Chirurg. Transactions, vol. xii, pt. i, p. 205.

In this case the first symptoms are those of neuralgia from injury of the nerve affecting its ultimate distribution; shown by pain in the course of the dorsal cutaneous nerves of the thumb derived from the cutaneous branch of the radial nerve, and by increase of the pain from slight external contact. We then meet with the phenomena attributable to sympathy: the patient complained of pain in the injured nerve of the thumb, derived from the anterior branch of the superficial division of the radial nerve, as well as the index finger, and on the radial side of the middle finger; and there was even pain in the hand, arm, and neck. It is evident that these sympathetic pains are not brought about in the peripheral tract of nerves, for they present no anastomoses by which we can account for such conduction; and besides, it is sufficiently demonstrated by the influence of accidental causes in exciting and increasing the pain: this influence was manifested even after interrupting the connection of the injured nerve with the brain, for whenever the patient was in any way affected after division of the nerve, he complained of pain in his hand and arm. The case under consideration also exemplifies the law of eccentricity. Although the thumb was numbed by the loss of its nerve of sensation, it became painful when the digestion was deranged. The cause here operates upon the central organ, and affects the origin of the cutaneous nerve of the thumb. The sensation thus excited is referred by the rule of eccentric action to the periphery of the nerve, which may be said not to exist, as its connection with the body of the nerve is destroyed.

We find a similar case detailed by Abernethy,[1] and another, which was marked by the most violent paroxysms, by Swan.[2] "Miss W—, aged 23, on the 20th of December, 1822, wounded the ulnar side of the second finger of the left hand, near the middle of the second phalanx, while she was attempting to cut an orange. She was immediately in great pain, which extended over the hand and up the arm, and after some days was continued to the centre of the left breast, and up the left side of the neck to the face, along the branches of the facial portion of the seventh nerve.

On the 26th the wound was nearly healed; the wounded part was tender to the touch, and pain was produced on making pressure beyond the wound, or that part nearest the tip of the finger. There was an insensibility or numbness of the opposite side of the finger, which was very great in the first few days, and then gradually diminished, but never went away. The arm could hardly be moved in any direction without pain, but this was frequently great when the hand was at rest. Opening the fingers, or stretching the wounded part in any way, produced much pain, but this was excruciating when she attempted to move the limb with the hand in a state of pronation. Whenever she attempted to read, pain was produced in the superciliary nerves of the left side, so that she could not read longer than about five minutes. A poultice was applied to the finger, and afterwards the extract of belladonna and opiates and antispasmodic medicines were given.

---

[1] Surgical Observations on Injuries of the Head, and on Miscellaneous Subjects, 4th ed.; London, 1825, p. 209.

[2] A Treatise on Diseases and Injuries of the Nerves; London, 1839, p. 129.

On the 11th of January the symptoms continued nearly the same, and as her health appeared to be suffering, I divided the nerve by making an incision across the side of the finger, near the middle of the first phalanx. Immediately afterwards the cicatrix could be pressed without pain, and complete insensibility of that side of the finger was produced. She could move her hand and arm in any direction without pain, and, in fact, was immediately and completely relieved.

12th. She has had a little pain in the arm and neck, and complains of much pain in the joint between the first and second phalanx, but she can move her arm in any direction without pain, and her feelings are altogether different from what they were before the operation.

16th. Last night she had pains in the neck, which struck chiefly to the back of the ear, but each attack lasted only about five minutes. She has always some pain at the inner side of the arm.

20th. She had some pain in the face on the evening of the 18th, but yesterday it was very severe, and came on like the tic douloureux. The weather was intensely cold; the last wound is nearly healed. She was ordered to take half a drachm of subcarbonate of iron twice a day. This evening she also had violent pain for two hours.

25th. She had much pain in the arm and clavicle, but not so much in the face.

February 2d. She has had pain and tenderness in her right side, below the ribs. She had inflammatory affections of the liver before the accident. She was ordered to discontinue the iron, to have eight leeches applied to the side, and to take four grains of submuriate of mercury at bedtime, and aperient medicines in the morning.

10th. She is in every respect better, and has had very little of the tic douloureux for the last few days. She can move her arm in every direction when the hand is shut, but has pain when the fingers and hand are extended together.

23d. On the evening of the 21st the pain in the arm, neck, and face was very severe, and continued until midnight; there is a small tumour in the cicatrix, which is very tender.

March 5th. She has had bleeding several times from the left side of the nose, and the same pains; she has now much pain in the hand, and particularly in the finger, and the posterior part of this. When the arm is moved with the finger extended, there is pain all along this, but it did not strike up the arm. As her health appeared to be suffering, and as she could not use her hand, and the functions of the nerves of the finger were altogether disordered, the finger was amputated at the joint between the metacarpal bone and the first phalanx. On examining the finger at the original wound, a small fibril of the digital nerve was found divided; the end of this next the lip was incorporated with the cicatrix, the other was formed into a small bulb. At the place of the division of the nerve at the first operation, both extremities of the divided nerve were incorporated with the cicatrix, and likewise those of the dorsal branch, which had also been divided.

8th. She has had a very good night, but had some pain in the neck this morning. She frequently feels the same pain in the finger she did before it was amputated.

17th. When she extends her arm and hand, there is the same pain in the finger as before the amputation.

21st. Her general health continues to improve, but she has had pain in the hand, arm, and neck. The wound is quite healed, but there is still tenderness on each side of the stump.

In July 1823, she went to the sea-side, and here first complained of her spine; she discontinued bathing, and appeared in better health. About the end of November, she complained very much of pain in her back and tingling in her arms, with a difficulty of supporting herself erect. On examining the spine, percussion produced more uneasiness in every part than is usually manifested, and much pain about the lower dorsal vertebræ.

April 2d, 1824. She has at various times suffered much from spasms about the chest; her appetite has been generally bad; she has been obliged to take an opiate every night, for when she omitted it for a few nights, the spasms were more frequent. She occasionally complains of pain in her back, and especially if her hand be raised. She was seized with a violent pain in the left knee, which continued for two or three days. On making an examination of the spine, pressure on each side of the spinous processes of several of the vertebræ produced pain, and percussion with a key made it very severe. She has had difficulty in voiding her urine. A blister was applied to the spine, after which the spasms about the chest were less severe, and her health has improved. Her father had a paralytic stroke; this made her very uneasy, and brought on an attack of tic douloureux in the face. During the summer her state was various. Sometimes she had considerable pain in her back and chest, and then her digestive organs were generally disordered. She does not now complain of her hand, but has numbness and want of feeling in the left hip and shoulder; she has pain at the back of her neck, and feels as if the neck could not support the head. In November she hurt her hand just where the finger was amputated, and she has complained of pain ever since, and feels the amputated finger very sore; this sensation, however, soon subsided. At the latter end of the year 1825 and the beginning of 1826, she was affected by dizziness, in fits of which she fell down, but never entirely lost her consciousness. She went to the seaside in August, 1825, and returned home about the end of September very much improved in health. The left arm and leg are weaker than the right. In 1829, Mr. Swan left Lincoln, where the patient resided. She subsequently suffered from pains in the hand and the amputated finger, to which other complaints were superadded. The tic douloureux also returned. She often suffered from sneezing, strangury, and pain under the nails of the fingers and toes. Throughout her illness the left side was most affected. In 1833 she still continued in the same condition."

One of the most ordinary causes of neuralgia induced by injury to the nerve is venesection, especially when the fleam[1] is employed, and the arm is not nursed after the operation. We do not frequently meet with cases in which the irritation of the nerve fibres is caused by foreign bodies lying in the course of the nerve. Denmark[1] has observed and described a case of this kind, of which the following are the main points:

---

[1] [It may be well to observe, that the "schnepper" or fleam, is an instrument not unfrequently used in Germany for venesection; it is a single lancet enclosed in a

"Henry Croft, a healthy young man, belonging to the 52d regiment, was wounded at the storming of Badajos. A musket-ball entered the triceps extensor cubiti about one inch and a half above the inner condyle of the os humeri, grazing the inside of that bone, and passed obliquely downwards through the brachialis internus, and out anteriorly near the bend of the arm. The wound soon healed, and without manifesting any particular morbid symptom during the cure. On his admission into Haslar Hospital, I found him labouring under excessive pain, which the largest opiates could not assuage, with almost constant watching. The little sleep he had, if it could be called such, was disturbed by frightful dreams and starting. I always found him with the forearm bent, and in the supine posture supported by the firm grasp of the other hand. The wrist also was bent, being unable to move it into any other position by the voluntary exertion of its own muscles. He could suffer me to extend the hand, but with increased pain. It always, however, on the removal of the extending power, fell into its former bent situation. The act of pronation he could also suffer me to perform, but, in like manner, with increase of pain. A small tumour could be felt in the site of the wound on the anterior part of the arm, which he could not bear to be touched without evincing additional torture. He described the sensation of pain as beginning at the extremities of the thumb, and all the fingers except the little one, and extending up the arm to the part wounded. It was of a burning nature, he said, and so violent as to cause a continual perspiration from his face. He had an excoriation in the palm of the hand, from which exuded an ichorous discharge. The cause of this he ascribed to a shell rolling

---

metallic box, and acting by a spring, upon the same principle as the cupping instrument. At all times a dangerous instrument, it becomes still more so in unexperienced hands, from the very fact of its supposed security.—Ed.]

[1] An example of Symptoms resembling Tic Douloureux produced by a Wound in the Radial Nerve. (Medico-Chirurg. Transact., vol. iv, p. 48.)

over it. His agonies, he observed, were insufferable, depriving him of sleep and the enjoyment of his food, for which he had some time an appetite. He declared himself incapable of enduring it any longer without some relief, and earnestly requested the removal of the arm. Before proceeding to any operation, I recommended him to try the effects of the warm vapour baths, but from none of these he experienced any alleviation of his sufferings. The symptoms were sufficiently clear, I conceived, to lead to a correct diagnosis. The part wounded, the nature of the pain, and its course from the fingers, with the exception of the little one, indicated the affection to be in the radial nerve. The increased pain attendant on the act of pronation further corroborated that supposition, from the pressure of the pronator teres upon the nerve in its passage through that muscle. In a consultation which I held with my colleagues on the case, when we considered the chances of failure, together with the injured state of the arm, and contracted elbow-joint, we determined on the propriety of amputation. I immediately performed the operation, and with instantaneous relief to the patient. He was discharged cured in three weeks, having in that time rapidly recovered both his health and strength. On dissecting the arm I traced the radial nerve through the wounded parts. It seemed to be blended with and intimately attached to them for the space of an inch. It had been wounded, and at the place of the injury was thickened to twice its natural diameter, and seemed as if contracted in its length. On further examination I was surprised to find, on dividing the fibres on the posterior part of the wounded nerve, that there was a small portion of the ball firmly imbedded in it, which had been driven off by grazing the bone."

Tumours developed within the nerves, the so-called painful tubercles, act in the same way as foreign bodies. They are rarely tubercular, but generally of a fibrous or fibro-cartilaginous character; of a round shape and small dimensions, between the size of a millet-seed, a pea, or, at the most, of a bean; they lie in the cellular tissue, between the fasciculi of nervous fibres, especially of the cutaneous nerves, and most frequently in the extremities. They are generally solitary; it is unusual to meet with several in the same individual. They are stationary in point of size, and though they may exist for a series of years, they do not increase. When superficial they cause a slight elevation of the skin, the colour and texture of which is unaltered; they are moveable, and are perceptible to the touch by merely applying the finger to the part.

The pathognomonic symptom consists in violent pain coming on in paroxysms, excited by external causes, such as compression or blows, or by affections of the mind and atmospheric changes: the causes are sometimes not to be traced. The most violent pain manifests itself in the tubercle itself; it shoots like an electric shock along the peripheral distribution; it rarely takes a centripetal direction, and is at times accompanied by sympathetic affections of other cutaneous nerves. During the paroxysm, the skin is so excessively tender, that the most superficial and gentlest contact increases the pain, which is not the case in the intervals. The paroxysms last from ten minutes to several hours. The frequency and intensity of the attacks appear to increase in the ratio of the duration of the disease. Many patients enjoy interruptions of days and weeks, others again have repeated attacks in the course of four and twenty hours. In some the seizures occur at night, attended with great terror.

We know little or nothing of the causes of the complaint. Sometimes it has followed a blow or a puncture. The female sex has an undoubted tendency to the affection. Out of 18 cases Wood[1] has observed it 14 times in women; and of the 13 cases quoted by Descot,[2] 10 occurred in females and 3 in males. The three cases which I have met with also affected women.

There is another variety of tumours, whose habitat is in the peripheral nerves; it is called *neuroma*, and consists of fungous and scirrhous tissue, in whose interior not unfrequently cavities and cysts are found, containing a variety of fluids. The fibres of the nerve are generally spread over these tumours like a fan. (We shall speak of the microscopic appearance of a tumour of this kind under the head of cutaneous anæsthesia.) They attain a considerable magnitude, increasing to the size of a hen's egg and more; they are generally moveable from side to side, but cannot be moved longitudinally without exciting severe pain. The cutaneous coverings present a normal appearance. Their growth is generally rapid, and in the course of their existence they present an alternation of increase and decrease. The cause of the affection has never been ascertained; the tumours have not been met with before the age of puberty; they are more frequent among the male than the female sex; the symptoms do not differ from those of the painful tubercle.

---

[1] Wood on painful Subcutaneous Tubercle, in Edinb. Med. and Surg. Journal, vol. viii, pp. 283 and 429.

[2] Descot, Dissert. sur les Affections Locales des Nerfs; Paris, 1825, p. 208.

When a cutaneous nerve has been wounded, the treatment should, from the commencement, be considerate and careful, though the wound may apparently be of a trifling character. Foreign bodies should be removed, healing by first intention promoted, and perfect rest of the affected part enjoined. We must then seek to limit the extent of the inflammatory process by leeches and cold lotions; while gastric derangement, which easily supervenes, has to be combated by repeated purgation. The paroxysms may, however, attain such intensity, that these measures do not suffice, and the division of the nerve is rendered necessary. A case is related by Swan,[1] of a girl who had been bled, and a few days after was seized with violent convulsions, followed by sopor: at the time of the venesection she had complained of much pain in the arm, which extended up to the shoulder. The wound had not cicatrised, and was rather inflamed; the examination at once excited a convulsive attack, which was removed by the application of a tourniquet above the seat of injury. The convulsions soon after returned. Injury of a cutaneous nerve was assumed to have taken place, and an incision above the wound of one inch in length and some depth was made. As the symptoms continued, a deeper and longer incision was soon after repeated above the first, with such effect that the patient immediately recovered herself, and the pains and convulsions ceased. Medical advice is not, however, always taken directly after the occurrence, but after a considerable time has elapsed, when the wound has cicatrised, and the patient has been reduced by sufferings. In this case the cicatrix should be first examined, and narcotic inunctions tried, *e. g.* Extr. Belladonnæ, ʒj; or Pulv. Opii, ℈j, to Adipis, ℥j.

---

[1] A Treatise on Injuries and Diseases of the Nerves; London, 1834, p. 117.

Counter-irritants may be tried, such as Pearson's[1] favorite remedy: ℞. Olei Olivæ, ℥iiss; Ol. Terebinth., ℥iss; Acid. Sulph., ʒj. M.; and this should be continued until the appearance of an erythematous rash. The value of these remedies is not very marked, and surgical interference becomes necessary. We are left the choice between *excision* of a portion of the nerve above the seat of injury and *amputation*. The latter is the safer proceeding; and in the case of small members, such as fingers or toes, it should be preferred.[2] When the larger extremities are affected, excision should be attempted, unless urgent reasons, such as a high degree of constitutional irritation, render amputation preferable. Benefit has been occasionally obtained by mercurial salivation.[3] When tumours exist in the nerves, and especially if they are superficial, excision is absolutely necessary.

If a constitutional affection remains, and the sympathetic sensations are very intense, steel medicines, with salt and sea-baths, are advisable; at the same time, it is necessary to watch the spinal cord in case of its becoming involved.

Before passing to the description of the varieties of neuralgia, I must advert to a few points, and especially to a phenomenon for which we are as yet unable to offer a physiological explanation. I allude to the occurrence of pain, not only at the peripheral terminations, according to the law of eccentricity, but also at certain points of the nerve, such as the vicinity of its exit from a bone, or its passage through fibrous membranes, and where it lies close to the skin. Thus, by striking or pressing upon the ulnar nerve at the elbow, a sense of numbness is produced at the point of injury, and in the fourth and fifth fingers; in the same way, pain is not only frequently manifested in the seat of the painful tubercle, but also in the peripheral terminations of the irritated nerves. This sensation occurs spontaneously, or from some external cause; Valleix looks upon this as pathognomonic of the painful tubercle. It is said that there are one or more circumscribed points in the course of the neuralgic nerve, which are very tender when pressed by the point of the finger, either in or out of the paroxysms.[1] In cases of neuralgia of the fifth pair, such painful spots are to be met with at the supra-orbital, infra-orbital, and mental foramina, in the lip, the nose, and the temples. I have never been able to confirm this statement as regards the periods of intermission, though I have instituted repeated examinations as to the point. During the paroxysms I have often seen the patients apply their fingers firmly to the points at which the fifth pair issued, in order to obtain relief by increased pressure. This is confirmed by Bell's observations; thus he gives a case in which the pain came on suddenly, and in paroxysms of great intensity, like electric shocks. The patient at once applied one finger to the infra-orbital foramen, another to the inner canthus of the eye, and a third to the frontal nerve, and remained immovable in this position.

---

[1] Medico-Chirurg. Transact., vol. viii, p. 266.

[2] See Wardrop's account of a case, where a severe nervous affection came on after a punctured wound of the finger, and in which amputation was successfully performed. (Ib., vol. viii, p. 249; vol. xii, p. 240.)

[3] See Hamilton's valuable Paper on certain consequences of Injuries to the Nerves, in Froriep's Neue Notizen aus dem Gebiete der Natur und Heilkunde; 1838, vol. vii, No. 18, p. 282.

The opinion has been maintained that the pain of neuralgia is confined to the course of a nerve, so as to follow its trunk and ramifications. Close observation shows that the pain only occurs at certain points of one or more nervous tracts, either concurrently or successively, but in the latter case with such rapidity as to cause a semblance of continuity. New and unsophisticated patients afford more trustworthy evidence on these matters, than parties who have been subjected to medical questionings for years past.

The state of sensibility during the intermissions of the neuralgic attacks, deserves special attention. It is only at the commencement of the disease that it remains normal; as the disease continues, the patients complain of a dull aching and a sense of numbness in the affected part, without a diminution in the sensitiveness of the part being perceptible on external manipulation.

---

[1] Valleix traité des Neuralgies; Paris, 1842, pp. 666—672.

CHAPTER IV.

NEURALGIA OF THE FIFTH PAIR.

SYNON.—*Dolor Faciei Fothergillii.—Prosopalgia.—*
Tic Douloureux.—Facial Neuralgia.

Experimental Results.—Irritation of the sensitive branches and fibres of the fifth pair and its ganglion excites violent pain in the living animal, more so apparently than the irritation of other sensitive cutaneous nerves. Division of the fifth pair within the cranium, as effected by Magendie[1] and others, is accompanied by a loud scream indicative of pain.

In all its distributions and connections, the fifth pair communicates sensibility even to motor nerves. Through its agency the facial nerve becomes sensitive. Recent experiments have proved beyond a doubt, that the sensibility of the facial nerve is not inherent in it, but borrowed; for irritants applied to the facial nerve within the cranium, before its entrance into the auditory foramen, give rise to twitchings only, and not to pain.[2] If the trunk is divided after its exit from the stylomastoid foramen, the facial branches exhibit traces of sensibility, because the connection with the fifth pair is undisturbed.[3] When the trigeminus has been divided, whether in or out of the cranium, the facial nerve shows no trace of sensibility, in the former case throughout its distribution, in the latter in its separate branches.

Surgery affords such numerous proofs of the fifth pair being a nerve of sensation, that it is almost superfluous to quote any instances. During the year 1837 I was present during the removal of a steatomatous tumour, which my deceased friend Professor Dieffenbach performed with his acknowledged mastery. The patient behaved with heroic patience until the moment when, in sawing through the bone, the infra-orbital nerve was torn; she then screamed out, and leaped from her chair in agony.

---

[1] Leçons sur les Fonctions et les Maladies du Système Nerveux, t. ii, p. 21.

[2] Valentin, de functionibus nervorum cerebralium et nervi sympathici, p. 32, § 70.

[3] Magendie, loc. cit., p. 198.

Sketch of the disease.—There are generally no premonitory symptoms, but occasionally a sense of tension, itching, or creeping precedes; the pain comes on in paroxysms at some point of the face or its cavities; it is confined to one side, and the stabbing, bearing, or crushing pains are of the most agonising character. They rarely remain limited to one spot; they generally dart with the rapidity of lightning forwards and backwards, to near or more remote points, and with rare exceptions maintain the same course in every paroxysm. The paroxysm is made up of small attacks, and recurs at irregular intervals. The more frequent its renewal, the longer the disease lasts, the more sensitive the affected side of the face becomes to gentle, unexpected, or superficial contact, which generally gives rise to an immediate and violent accession of pain. Mere touching or stroking the part, or passing the razor over it, may suffice to induce it, whilst the application of strong pressure generally fails to do so, and even affords relief. Trifling movements of the facial muscles, in speaking, chewing, or blowing the nose, excite the pain. During its continuance the muscles of one or both halves of the face twitch or continue in an immovable fixed position. The complexion is frequently altered, the painful part looks flushed and shines as if it were oiled. The arteries pulsate, the veins are tumefied; the temperature of the suffering portion is exalted, whilst the hands and feet are chilled. At times the whole body trembles, and the sensitiveness is generally increased.

The attacks and characters of the pain vary in different individuals as well as in the same patient. The physician has a greater difficulty in rendering a faithful picture of the disease than the educated patient experiences, when, after suffering for a long period, he has acquired sufficient self-control to observe himself. A delineation of this kind is to be met with in Barth's excellent treatise.[1] The description by Valleix[2] of neuralgic pains is less faithful, independent of its manifesting an utter ignorance of the laws of isolated conduction and eccentric phenomena, as well as a want of sound physiological reasoning.

---

[1] Mehrjährige sorgfältig angestellte Beobachtungen über den Gesichtsschmerz, nebst einem Vorworte, von Prof. Dzondi; Leipsic, 1825.

[2] Traité des Neuralgies; Paris, 1841, pp. 34, 50, 99, &c.

The direction of the pain varies according as the neuralgic affection occupies different branches of the fifth pair. The region of the second branch, the superior maxillary, is most commonly attacked. The pain makes its appearance at the alæ nasi, the upper lip, or in the upper row of teeth, or it penetrates the gums and the posterior nares. The ophthalmic branch, and especially its frontal offset, is the next in order of frequency. The pain darts upwards to the forehead or the eye-brows, at times it shoots to the angle of the eye, or the caruncula lacrymalis, or it rages in the globe. Tears are a common symptom or sequel of this affection. The third branch is more rarely the seat of neuralgia; when it does occur here the pain is spread over the lower teeth, the chin, the nether lip, and the edge and point of the tongue, and is generally accompanied by a flow of saliva. A single branch may be affected, or several simultaneously, or they may be attacked alternately.

Some authors have assumed the facial nerve also to be a seat of neuralgia, nor can it be denied that the pain at times darts along the course of this nerve. The physiological explanation offered is, that the facial nerve is not exclusively one of motion, but originally a compound of motor and sensitive fibres, the portio intermedia Wrisbergii being looked upon as the sensitive constituent.[1] The experiments quoted above prove the inadmissibility of this assumption, and pathological observation is equally opposed to it. I have had repeated opportunities of convincing myself that the sensibility of the parts is in no wise altered when the facial nerve is paralysed by injuries in the vicinity of the stylomastoid foramen, or by a tumour pressing upon the trunk of the nerve. Magendie[2] has noticed that during the treatment of paralysis of the facial nerve by galvanism, pain was excited not only by insertion of the platinum needles into the skin, but also that when the branches of the facial nerve were pricked, pains of a peculiar character were felt, extending in all directions, to which the pricked branch sent filaments, and which were dependent upon the fibres of the fifth pair accompanying the former.

---

[1] [The facial nerve arises by two divisions: the larger takes its origin between the restiform and olivary bodies; the lesser lies external to the former, and between it and the acoustic nerve; it arises by several filaments which unite to form a small nerve,—this is called the portio intermedia Wrisbergii.—Ed.]

See the excellent Dissertation of Gädechens, 'Nervi facialis Physiologia et Pathologia;' Heidelberg, 1832, p. 18.—Arnold, Untersuchungen im Gebiete der Anatomie und Physiologie, vol. i, p. 210; Zürich, 1838.

[2] Leçons, &c., vol. ii, p. 209.

Course and duration.—Facial neuralgia takes a periodic course with a regular or an irregular type. In the former case the supraorbital nerve is most commonly affected, and the type has the quotidian character; the tertian is rare; the quartan never occurs, and the disease itself is of short duration. One of my patients had for eight years an annual autumnal attack of frontal neuralgia, with a quotidian type. With the exception of some shivering, which preceded or accompanied the attack in some cases, I have not observed heat, perspiration, or urinary sediments during or after the attack. When the affection presents no regular type, it continues for years; it may last half the life and longer, making occasional intermissions of six months and more. Neuralgia also intermits during the occurrence of other intercurrent diseases.

Termination.—Halford[1] states that apoplexy is the ordinary termination of this disease. Psychical affections, depression of spirits, a morbid taste for seclusion, and tædium vitæ generally follow in its train. One of my patients, an old woman æt. 72, who had suffered from tic douloureux for thirty years, drowned herself after repeated futile attempts at suicide.

Post-mortem appearances.—We possess but few and incomplete records of the post-mortem appearances of facial neuralgia, and they have been supplied by English medical men. Sir H. Halford, in his essay on Tic Douloureux, refers to several cases in which he has met with hypertrophy and other morbid conditions of the cranial and facial bones; such as thickening of the frontal, ethmoid, and sphenoid bones, to the extent of half an inch, exfoliations of the alveolar processes of the teeth, exfoliations of a piece of bone from the antrum highmori, and exostosis of a tooth. Two other inquiries have since confirmed Sir Henry Halford's observations. In the museum of Guy's Hospital, in London, there is the cranium of a neuralgic patient[1], upon the internal surface of which a very considerable osseous deposit is found. Travers[2] describes the post-mortem appearances met with in the well-known London physician, Dr. Pemberton, who had suffered from neuralgia of the left infraorbital nerve. The frontal bone was unusually thick, having a diameter of $\frac{3}{8}$ths of an inch above the frontal sinuses, and of more than $\frac{2}{8}$ths at its junction with the parietal bones. In the falx cerebri, not far from the crista galli, there was an osseous concretion. There was congestion at the surface, and within the white matter of the right hemisphere, while the right showed no trace of it. The right lateral sinus was also full of blood in the vicinity of its communication with the jugular vein. The ventricles contained seven and a half drachms of serous fluid. Finally, we are favoured with the following account by Dr. Bright.[3] "Mary Grossmith, aged 40, from Westerham, was admitted, under my care, into Guy's Hospital, in August 1827. She was thin, and her countenance was strongly marked by the effects of long suffering. Her most prominent symptom was extremely acute pain on the left side of her face, which was seldom completely removed, but became more severe in paroxysms. It was regarded as tic douloureux by all who had seen her, and resisted all the means employed for her relief. Within about a fortnight of her death, three molar teeth on the affected side were drawn at different times: after each operation the pain for a time was rendered less severe, but an offensive discharge proceeded from the wounded gums; and for a few days before her death, a discharge of the same kind took place from the nose also.

---

[1] Essays and Orations read and delivered at the Royal College of Physicians; London, 1831, pp. 37—51.

"*Sectio cadaveris.*—The membranes about the upper part of the brain offered nothing remarkable, but the quantity of serum, both external to the brain and in the ventricles, was more considerable than is natural. The fifth ventricle was rendered very conspicuous. The brain was softer than in perfect health, and the medullary matter slightly mottled with a light purple cloud. The dura mater, immediately under the anterior part of the left middle lobe, was considerably but irregularly elevated by fungoid tumours, equal collectively to about the size of a pigeon's egg. There was a corresponding depression in the substance of the brain, which at this spot was slightly adherent and disorganised, but not completely softened, nor was the raised portion of the dura mater ulcerated or materially altered. The bone beneath the tumour was diseased, and in some parts offered no resistance to puncture. The morbid growth appeared to have extended from the sphenoidal sinuses. The mucous membrane, having all the nasal cavities on that side, were similarly affected, but to a less degree. There was a soft pedunculated polypus, of about the size and shape of a raisin, attached between the turbinated bones. The branches of the portia dura, so far as they were laid bare in the removal of the diseased parts, exhibited no morbid appearance."

---

[1] Catalogue, No. 1074.

[2] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 351.

[3] Reports of Medical Cases, selected with a view of illustrating the Symptoms and Cure of Diseases by a reference to Morbid Anatomy, vol. ii, part ii; London, 1831, p. 506.

As the information afforded by pathological anatomy on the cause and seat of facial neuralgia was so very limited, I was much gratified by having the opportunity of examining a case of the kind myself. It was one of a man who had for twenty-six years been a martyr to facial neuralgia, and who had been under the joint treatment of myself and the late Dr. Formey thirty years previously. During the last ten years of his life, my esteemed friend, Professor Barez, and Dr. Philipp were his physicians; to the latter I am indebted for the following history. The post-mortem examination was made by the experienced hand of Professor Froriep, who was also kind enough to make the artistic and instructive drawing accompanying my academical treatise.[1] Mr. F—, one of the best informed and most respected merchants of Berlin, was born of healthy and robust parents. His mother died at sixty-four, and his father attained the age of eighty-four; the latter suffered much from gout. An elder brother, who still survives, states that the subject of the present account was a fine healthy child, who received his first nourishment from a healthy wet-nurse. As a boy he got over several serious diseases of childhood successfully. He stammered early, and had a particular difficulty in pronouncing L and N. This defect accompanied him to the grave. At the age of twenty-eight, the patient entered into a matrimonial alliance, which was not, however, of long duration. Towards his fortieth year, a chronic and very irritating eruption occurred on the inner side of the thighs, the perineum, and scrotum, which gradually disappeared. Immediately after it had done so, the neuralgia made its debût. It seems advisable, in the description of the disease, to commence with what I gleaned by my own observation, and occasionally to introduce the fragmentary communications of the patient, who showed a strong disinclination to speak of his sufferings.

---

[1] Neuralgiæ Nervi quinti specimen; Berolini, 1840.

Mr. F— was in the fifty-seventh year of his age, and in the eighteenth of his sufferings, when I first saw him. He was of middle stature, and tolerably fat, his abdomen projected; the vicinity of the nipples was well padded, and the extremities, though not muscular, were plump and voluminous. His gait was that of an old man, with a curved back, the head bent forward, and tottering steps. All his movements exhibited the greatest clumsiness; the patient was unable to put on a single article of dress without assistance. His face presented so strange a conformation, and made so unpleasant an impression upon all who were unaccustomed to it, that children could scarcely be induced to kiss him. The cranium was largely developed, but the face appeared excessive in proportion to it. Both cheeks presented a dark red complexion, which became more or less livid in proportion to the violence of the paroxysms; the left showed it more intensely than the right. Both cheeks were affected with acne, which disappeared and reappeared periodically, though not in any ratio with the paroxysms and intermissions of the neuralgia. The prominent and fleshy nose exhibited the same discoloration as the cheeks. The lips were never entirely closed, as the nether one was much tumefied and drawn over to one side. This distortion increased when the patient laughed or stammered, and gave the face the appearance of a comical mask. The front teeth of the lower jaw alone remained—those of the upper jaw had all been removed during the first years of the malady, because the cause was supposed to reside in them. Extreme short-sightedness and very large eyes further characterised this peculiar physiognomy.

The left side of the face was the seat of the neuralgia, and though I often put the question, whether any painful sensation occurred on the right side, the patient invariably denied it;

besides I have had repeated opportunities of convincing myself that the left eye was chiefly reddened after the attacks, that the left cheek assumed a livid hue, and that he used his pocket-handkerchief chiefly to cover and compress the left half of the face. During the intervals I was occasionally permitted to test the sensibility of the two sides with a needle. The result was invariably the same, viz. exalted sensibility of the left side of the face in the entire range of the fifth pair. There was no difference of sensibility on the two sides of the tongue; both sides tasted alike and normally. I never heard the patient complain of pain in the hard and soft palate. Shaving repeatedly induced an attack; the upper lip close to the septum nasi was peculiarly susceptible to the touch of the razor.

When the patient was asked, after a paroxysm, to designate the place where the pain had raged, he either pointed to the left eye and the parts adjoining outside and above, or he passed his finger from the inner canthus of the eye down the nose, or he pointed to the lips, the tongue, the cheek, and the temples. He frequently placed my hand on one of these regions, that I might feel the pulsation of the arteries; the pulsations were particularly violent when the temple had been the seat of the attack. During the paroxysms, and often long after, convulsive movements were perceived on the lower eyelid, the cheek, and upper lip; the patient's aspect was frightful when the tongue was thrown about, or as he expressed himself was being ground. We have already observed, that the veins were much developed in the parts most affected, the cheek and the nose.

When the ophthalmic branch was attacked, the eye was bloodshot during the paroxysms and for some time after, as in an advanced degree of traumatic ophthalmia; it projected from the orbits as if this had become too contracted for it. At the same time there was tumefaction of the eyelids, and a copious discharge of tears and mucus from the nose. Salivation ensued, when other branches were affected, and formed one of the most troublesome symptoms, as it was associated with a foul tongue, loss of appetite, and almost unquenchable thirst—besides it often continued during the intervals for weeks and months, every letter written by the patient, his clothes and his linen, showing traces of this affection.

The paroxysms seized the patient without the slightest premonitory symptoms with the velocity of lightning; he might be talking, and they cut the word he was uttering, or they attacked him, and this was more frequently the case, while he was eating or drinking, or coughing, sneezing, or driving over the pavement, while shaving, or if in any way excited; but as often there was no exciting cause to which the attacks could be referred, and the patient might be perfectly at rest. They lasted one minute at the most; they differed much in intensity; it was most violent and insupportable when seated in the interior of the nose, the patient then felt as if his face was being burst asunder. In the milder attacks he was able to continue in the position that he happened to occupy when they came on; he pressed a pocket-handkerchief against his face, and only occasionally emitted a groan of suffering. When more violent they forced him from his seat and drove him through suites of rooms; they compelled him to utter screams that more resembled a roar, and not only alarmed the inhabitants of the same house, but even reached the neighbours. During the latter years the paroxysms scarcely attained this extreme pitch. The exhaustion following them varied in intensity, but always was more in the ratio of the general state of health than of the intensity of the attacks.

It was impossible to trace any uniformity or type in the affection during the time that I was acquainted with Mr. F—. He was not secure against the cruel attacks at any time of the day or night, nor at any season. The patient had good and bad periods; he scarcely ever was free from the fits for a week, scarcely even a day, but in the bad times the attacks succeeded each other so rapidly that one could scarcely speak of intervals. Long-continued hot weather perhaps excepted, no atmospheric conditions appeared to exert any influence upon the disease.

The general health of the patient was, on the whole, good; it seemed as if the dreadful malady with which he struggled, protected him against many other complaints. Considering the rigid diet to which he was subjected during the last ten years, his strength was satisfactory. He was able to stand for hours at his desk engaged in writing and calculating, or to walk for hours in his garden.

[illegible] of his life that there was a
[illegible] and that an evident affection
[illegible] manifest. Two symptoms indi-
[illegible] one was the inability to retain
[illegible] time, —the other vertigo, which
[illegible] time while walking; it caused him
[illegible] on his left side, although he was
[illegible] resolve to maintain his balance at all
[illegible] was always accompanied by a great
[illegible] weakness in the lower extremities.

[illegible] remained untouched throughout the
[illegible] point out, as a remarkable physio-
[illegible] forced by his affection to avoid all
[illegible] himself, the patient showed no
[illegible] kindness, and continued to take a
[illegible] that generally occupies the attention
[illegible]

[illegible] by the unhappy
[illegible] these remarks. Volumes of pre-
[illegible] which the Pharmacopœia had
[illegible] weapon of sufficient strength to
[illegible] I shall confine myself to
[illegible] these attempts.

[illegible] was called into aid during
[illegible] but to the actual aug-
[illegible] especially refers to hydrocyanic
[illegible]

[illegible] first proved very serviceable
[illegible] this was the case with
[illegible]

[illegible] much, were obtained
[illegible] violent interference,
[illegible] attended to was a
[illegible] everything of a heating
[illegible] an occasional purge,
[illegible]

[illegible] urine, which does not
[illegible] main disease. It is
[illegible] of ischuria, ten days
[illegible] vanished entirely.

During the last four days of life sopor and convulsions supervened.

Post-mortem report.—The examination was made thirty-six hours after death, and was conducted by Professor Froriep in the presence of Dr. Philipp and myself.

The cranial bones were hypertrophied, being from four to five lines in thickness; the external lamella was unaltered; the diploe had disappeared; and the internal lamella had a diameter of about four lines, was somewhat porous, but on the whole firm and dense in texture. The inner surface of the calvarium was very uneven; the meningeal arteries running in deep grooves, towards which the bone was bevelled off so as to offer the greatest thickness in the middle between two arteries. The dura mater was so firmly attached to the bones, that it had to be removed with them. The inner surface of the dura mater showed several insulated red spots, and presented others that were larger and more numerous, especially over the left hemisphere of the cerebrum, which were covered with a gelatinous yellowish-red exudation of from half a line to one line in thickness; here and there new-formed vessels were seen, and it consisted of loose cellular tissue infiltrated with a serous fluid. On removing the calvarium and the dura mater, the cerebrum appeared atrophied. Instead of two uniformly arched hemispheres, we met with two irregularly-shaped surfaces, marked with and compressed by sulci and indentations. The arachnoid was thickened in parts, and underneath it there was a serous exudation, which from being infiltrated into the pia mater offered a gelatinous appearance. The gyri were narrower and thinner than they are in the healthy brain.

The brain, on being removed from the skull, presented reddening of the inner surface of the dura mater, with a reddish plastic exudation at the base, and especially on the sella turcica.

At the base of the brain a distension of the third ventricle by a watery fluid was visible; the arachnoid was opaque, and the arteries were morbidly changed. The right vertebral artery was atrophied; it was of the thickness of a crow's quill, while the one on the left side was thickened here and there, and of a larger calibre than usual. The basilar artery also presented several dilatations, at which the coats were thickened, and contained yellow cartilaginous points; the left internal carotid was dilated at its point of division, and its posterior half of treble the ordinary thickness from conversion of the fibrous membrane into cartilage.

The pons Varolii was more flaccid and softer than normal; especially as compared with other parts. Its right side was atrophied; an impression as if made with the finger ran along it from before backwards; the left half did not present the normal elevations, but there was no depression. The pia mater investing the pons was very vascular.

The trigeminus of the left side was only half the ordinary thickness,—slightly reddened, presenting one spot of a dark red; no filamentous structure was to be found in it, the nerve being almost reduced to a pulp. The smaller division of the nerve, which was also softened and attenuated, was only to be distinguished at the inner side of the nerve, at a distance of six lines from the pons. The trigeminus of the right side was thinner and softer than usual, and somewhat reddened; but the filaments and the smaller division were distinguishable in it from the commencement. The portions of the fifth pair left in the cranium, from the point of division to the point at which they entered into the fissure of the dura mater, also presented an unusual diminution of bulk and a slightly reddish-yellow tinge of the nerves; their filamentous structure became more apparent the nearer they were examined to their termination.

An horizontal incision was now carried through the crura ad cerebellum and the pons, immediately beneath the insertion of the fifth pair, so as to trace the fibres of the fifth pair as well as can be done in a recent brain in these central parts. In the first place, this section showed the grey matter of the pons diminished, while it was normal on the right, though externally more reddened by numerous distinct blood-vessels. The sectional surface of the left crus ad cerebellum presented a great number of delicate red spots of blood, which caused the white tract of the trigeminus to be the more apparent. At its external side, about a line and a half from the so-called origin of the left trigeminus, the medullary matter of the crus was rather reddened and softened, and contained an irregularly quadrilateral, hard corpuscle of the size of half a lentil, yellow, of a greyish translucency in the middle, and exhibiting increased density and hardness on examination with the scalpel. The right crus is normal, and the filamentous structure at the origin of the right trigeminus is more distinct than on the left side.

Both Casserian ganglia and their three branches, the first two of which were examined as far as the orbit on both sides, presented no abnormal appearance, except that the ganglia were rather paler than usual. No irregularity was perceived in the oculomotor and trochlear nerves. The abducens was traced in the cavernous sinus on both sides, and found to be normal. This, however, led to an important discovery. On opening the cavernous sinuses from above, the right carotid appeared normal, if we except a few points of cartilaginous deposit; but the left internal carotid was distended to double its ordinary calibre, so as to form an aneurism both in its anterior and posterior arch. The walls of these aneurisms were cartilaginous and much thickened: by their pressure the fossa that receives the carotid in the sphenoid bone, which ordinarily is shallow and merely traced out, (passing from the foramen caroticum to the side of the sella turcica,) was converted into a deep S shaped fossa. There was no trace of inflammatory action in the bone, but the left posterior clinoid process and the left side of the body of the sphenoid bone had disappeared by mere absorption. The left half of the pituitary gland was converted into a purplish-brown pultaceous liquid, such as also filled the entire left cavernous sinus, and surrounded the aneurism. As the ganglion Casseri lay between the plates of the dura mater, at the external side of the aneurism, it was necessarily exposed to pressure from it,—the more so as the base of the brain showed no change of position in the external wall of the left cavernous sinus,—and therefore the Casserian ganglion was bound down to the side of the body of the sphenoid bone by the tense dura mater. All the ventricles of the brain, including the fifth, contained a considerable amount of a reddish serous fluid.

Besides the brain, the urinary bladder was also examined with reference to the dysuria and retention of urine, from which the patient had suffered. It was found enlarged, the muscular fibres thickened, and the mucous membrane covered with considerable ecchymoses, as generally seen after ischuria. A large diverticulum presented itself on each side, projecting outwards through the muscular fibres of the bladder. Enlargement of the lateral lobes of the prostate, and of the so-called third lobe of the prostate, caused an almost entire occlusion of the neck of the bladder.

Where there are so many morbid changes in a single organ, it is necessary to seize the relations which bind the different links together. Thus we may, as it were, resuscitate the inanimate corpse, and convert what would otherwise be a mere epitaph into a living representation of the disease. In the present instance the general affection of the blood-vessels must probably be looked upon as the foundation and cause of the other changes that took place in the brain. Cartilaginous formations and incrustations of the cerebral arteries are not unusual after the fiftieth year; still a condition of this kind, universally affecting the arteries of the brain, is uncommon. The aneurism of the left carotid, the dilatation of the left and the atrophy of the right vertebral, are evidences of the further influence of such change upon the vessels. The influence exerted upon the nutrition of the brain appears equally important, and is most marked in the atrophy of the right half of the pons Varolii, which corresponds to the atrophy of the vertebral artery of the same side. The hemispheres of the cerebrum were also atrophied; they not only appeared compressed when the dura mater was removed, but the gyri individually were narrower and thinner than in the normal state. In order to fill up the space left by the atrophy of the cerebral tissue, we see the ordinary succedanea, exudation, between the membranes, and thickening and hypertrophy of the cranial bones.

This is the soil upon which the evil has grown, that gave rise to the long tortures of pain. The fifth nerve of the suffering side was affected in different ways at two points. In the first place, it was softened and had lost its filamentous structure at the point where it leaves the pons Varolii; the softening of its fasciculi was perceptible, even within the brain, in its passage through the pons and through the crura ad cerebellum, and an indurated node was found within them. In the second place, the Casserian ganglion, though normal in structure, was subjected to tension and dragging by the aneurysmatic swelling of the carotid and its pulsations. We may conclude, from the duration and slow progress of the disease, and the absence of anæsthesia, which commonly accompanies disorganisation of the fifth pair, that the irritation of the Casserian ganglion by the carotid aneurism had the precedence, in point of time, over the other morbid conditions; we do not, however, deny that the foreign yellowish body imbedded in the filaments of the fifth pair may have been a source of irritation, in the same manner as the painful tubercle acts in peripheral nerves. At all events, the coincidence of the two conditions more than suffices to explain the neuralgia and its not being amenable to treatment.

The physiological is as interesting and important as the anatomical point of view, because it is the one from which the diagnosis of this nervous disease obtains a higher standpoint and a firmer basis.

We here see a striking illustration of the law of eccentricity, according to which the irritation of a sensitive nerve, whereever the irritant may act, is referred to the peripheral distribution. In the present case, the cause of the neuralgia lay within the cranial cavity,—still there was no pain within the head; but it affected only the superficial parts of the face. As the entire range of the three divisions of the trigeminus was affected by the neuralgia, it was to be assumed that the mass of the primitive fasciculi of the nerve was involved in the source of irritation; for this reason I determined that, previous to the cadaveric inspection being held, the seat of injury occupied the middle root of the trigeminus before it forms the ganglion, or in its passage through the pons or the crus ad cerebellum, because I was unacquainted with a case in which an irritating body had been found in the Casserian ganglion.

Another law, regulating neurophysiology, the law of isolated conduction, was equally useful in this case, in pointing to the diagnosis of the seat of injury. The sensitive portion of the trigeminus alone was affected; the irritation was not even communicated to the closely adjoining motor portion, nor to one of the other cerebral or spinal nerves, so that the cause necessarily resided in the middle root or within the ganglion.

Besides the neuralgic affection, the vertigo occurring in this case, accompanied by a sense of inclination or rotation of the body to the left side, was remarkable. In the chapter on vertigo, we shall revert to the fact, that in vivisections the division of the pedunculi cerebelli ad pontem causes the animal to roll to the left side, and this often with such velocity as to produce a rotation in every second. In our patient, the left half of the pons Varolii and of the peduncle of the cerebellum were traversed by the softened filaments of the fifth pair; it is not too bold a conclusion, therefore, to look upon the affection of this peduncle, which was distinguished from its fellow on the right side by its softer consistency and more injected appearance, as the cause of the peculiar form of vertigo we have spoken of.

I admit my utter ignorance of the influence exerted by the aneurism of the carotid, in producing irritation and compression of the pituitary gland.

It is to be regretted that a sufficient amount of critical acumen has not been brought to bear upon the examination of the causes of facial neuralgia, and that acute neuralgia with a uniform type, and the chronic form presenting no type at all, have not been clearly distinguished. The former does not depend upon any particular constitution, but promiscuously attacks all ages, sexes, and stations. It occurs endemically in malarious districts; it has even been observed as an epidemic, and occasionally it is found in the train of intermittent fever. Facial neuralgia, with a chronic and irregular type, is much less frequent. It is unknown in childhood and youth, and generally occurs between the thirtieth and fiftieth years of life. Fothergill and Pujol have met with no patient who was under forty years of age. No etiological influence can be traced to sex. The wealthy classes appear to be more liable to it than the poorer orders,—the disease is therefore not often met with in hospitals. The influence of climate has not been accurately determined; but it probably occurs more frequently in the northern than in the southern latitudes.

Peripheral causes have not often been demonstrated. The case described by Jeffreys is remarkable on account of the coexistent histrionic[1] facial paralysis, and from having been cured. A piece of china, broken from a cup, had lodged for fourteen years in the right cheek of a girl, and caused violent pains that were so persistent that she was not exempt from them for a single day. A hard, pointed body was felt under the skin; the slightest touch of the place induced an attack. The triangular piece of china was removed by an incision; and, two months later, the sensitiveness which remained after the operation, had entirely disappeared.[1] Cruveilhier[2] details a case of very severe neuralgia, in the course of the facial nerve, in a female affected with carcinoma of the mamma. Incomplete paralysis of the face occurred successively in the different branches of the facial. On dissection, the facial nerve presented nodes in all its ramifications, and it was invested in a carcinomatous sheath of irregular thickness.

---

[1] [An apology is necessary for the introduction of this term, but mimic or imitative, which at first suggest themselves, as the English words corresponding to the

No case has been published, besides the one just related, in which the peripheral cause of the neuralgia giving rise to the irritation of the fifth pair lay within the cranium, between the insertion of the nerve and its exit from the skull. At all events, it will serve to direct the attention of future observers more to the condition of the sphenoid bone and the carotid passing through it: independently of this, the vicinity of the three points of exit of the branches of the fifth pair should induce this examination.

At present we are almost ignorant of the causes which give rise to neuralgic affections of the fifth pair by acting upon their central parts within the brain and spinal cord; the case just given proves the importance of examining the pons Varolii carefully. Our knowledge of the causes originating in other organs is equally imperfect. The digestive and uterine organs are often suspected to be at fault, though without a sufficient reason, beyond that the assumption serves as an apology for the treatment. Occasionally it is possible to point to metastatic processes, occurring especially in mucous membranes and glands in the vicinity of the brain, such as suppressed catarrhs, otor-

German term, *mimisch*, would convey an erroneous meaning; it is hoped that *histrionic*, which etymologically is strictly analogous to the German term, will prevent a misunderstanding. The constant recurrence of the term rendered it absolutely necessary to employ a word that conveys the author's exact meaning. He invariably uses it to designate affections of the muscles supplied by the facial nerve.—Ed.]

[1] Descot, Dissertation sur les Affections locales des Nerfs; Paris, 1825, p. 99.

[2] Anatomie Pathologique du Corps Humain, livr. xxxv.

rhœal discharges, exutoria or ulcers. Arthritic and impetiginous affections, anæmia, influenza, malaria, and rheumatism favour the development of facial neuralgia.

Among the occasional exciting causes of the paroxysms, we must mention unexpected superficial touch of the seat of neuralgia, movement of the facial muscles, especially of those of mastication, the concussion of sneezing, irritation of the eye or the ear, mental affections, and fatigue, vivid attention to the pain. Some patients suffer more violent paroxysms by day than by night; others are more frequently attacked during sleep. Atmospheric relations exert an unquestionable influence. Almost all patients of this class have a painful presentiment of the change of weather. Draughts, wind, great heat and cold, dampness, and electric tension, give rise to a greater frequency and intensity of the attacks.

Diagnosis.—There is no nerve of sensation whose activity is so frequently called into play as the trigeminus; the number of filaments at its point of insertion allows the assumption that its cerebral connections are the most extensive of all. This accounts for the frequency and ease with which sympathetic affections are excited in the nerve, and for the difficulty of distinguishing them from genuine neuralgic conditions. To avoid this error it is necessary to attend to the following points:

1. The relations of facial neuralgia in regard to time and space; it is confined to certain distributions of nerves, and occurs in paroxysms separated by a free interval: in sympathetic pains we notice change of seat and extension of their range, and the pain is a mask to some other complaint, such as disease of the facial bones; when this becomes worse, the facial pain increases in a corresponding ratio. A case is detailed in the 10th volume of the 'Journal de Médecine,' in which the disease originated in a wound of the arm, and was cured after two years spent in torture, by cauterisation of the cicatrix. The case quoted from Swan (p. 21) is of an analogous character. Hunt[1] gives an instructive case of a woman who, when in the seventh month of pregnancy, was seized with violent toothache, recurring night and day in attacks lasting one hour, and with intervals of two. It occupied the ramifications of the infra-

---

[1] On the Nature and Treatment of Tic Douloureux, Sciatica, and other Neuralgic Disorders; London. 1844, p. 99.

orbital and supra-orbital nerves as to resemble tic douloureux. In the second night the patient was awakened by the pain, and the waters broke, the pains ceased, and the night after the sluggish action of the uterus being stimulated by secale cornutum, parturition was effected. During parturition the neuralgic pain attained its maximum, but ceased after its completion. The placenta was retained a considerable time, and when the hand was introduced into the uterus for the purpose of removing it, the pain instantly returned with great severity, and lasted whilst it was being extracted. It vanished immediately after this was done, and did not return.

2. The peculiarity of the exciting cause of the pain.

3. The sensitiveness of the affected surface of the face to unexpected and slight contact, especially if the disease be of long standing; strong pressure, at the same time, not only does not increase, but often diminishes the pain.

4. The preference shown by neuralgia of the fifth pair for mature age, as it occurs only after the thirty-fifth year.

5. The rarity of the disease, which must increase our scepticism in forming a diagnosis. Painful sympathetic sensations in the face belong to the daily experience of the practising physician; whilst cases of facial neuralgia, except of the acute typical kind, are counted among the rarities of medical experience, even in large and populous towns.

It is quite excusable that, until recently, anæsthesia dolorosa of the fifth pair should have been mistaken for tic douloureux, as the former has but lately been properly understood. The most important criterion by which it may be recognised, is the insensibility of the painful surface to irritation, while in tic douloureux the parts become morbidly sensitive to the most superficial contact.

It is not difficult to distinguish it from spasm of the face, whether of the histrionic or masticatory variety, for these affections are rarely marked by any pain. The convulsive actions occurring in facial neuralgia, are the result of reflex action, and take place against the will of the patient. It is thus that we must explain the rotations of the tongue and the distortions of the lips, described in the above case.

Prognosis.—The most marked difference is shown in the course of the disease as regards the prognosis. Acute typical neuralgia of the fifth pair is generally curable, but is very liable to relapse. The chronic atypic forms are to be numbered among the diseases that most rarely cease, and may attain an advanced age with the individual without diminishing the duration of life by the agonies of pain.

The *spontaneous cures* of facial neuralgia are very rare; when they occur it is by transition into a disease of an allied and different character, such as gout, neuralgia, or impetiginous and ulcerative affections, whether on the face or at a distance; they may even take place by an entire disappearance of the disease by a process of resolution. In the case of a man of 72 years of age, who had been subject to neuralgia of the first and second branch of the right trigeminus for five years, I observed the sudden disappearance of the facial pains on the occurrence of herpes zoster in the right lumbar region; as the eruption dried up, the pain returned with its former severity, and obstinately resisted all the remedies employed.

Treatment.—We possess much hypothetical lumber, and a mass of clumsy empiricisms, but we are still much in want of trustworthy results as to the technical questions of treatment. There is only one result that we can safely promise; this is the cure of acute intermittent facial neuralgia, by aid of the vegetable or mineral antitypics, quinine, or arsenic. If, after a fair trial, we do not succeed with sulphate of quinine, given according to the violence of the paroxysms, in hourly doses of 2, 4, or 6 grains, which will rarely happen, we shall still find that Fowler's solution, at a dose of from 4 to 10 drops, will answer our purpose.

In chronic atypic neuralgia an effectual palliative would be a great boon to the tortured invalid; but all remedies that have been hitherto vaunted, either have no power whatever, or only retain it as long as they have the interest of novelty. Such are friction with and imposition of magnetic bars, washing with narcotic solutions, fomentations with solution of corrosive sublimate, the endermic application of morphia, rubbing it into the gums (¼ grain of the muriate), or inoculating the skin of the neuralgic part with it by the lancet; we may also mention the local application of cold, cold insufflation, cold washing, the application of pieces of ice, steam-flying blisters, frictions, &c. Turnbull and others have recently recommended the use of veratrine, employed in the following manner: an ointment containing twenty grains of veratrine to an ounce of lard is to be rubbed into the entire seat of pain during the paroxysm, for from fifteen to twenty minutes, until the warmth and pricking induced by the inunction is equal to the neuralgic pains. The friction is then to be desisted from for a short time, in order to let the irritation subside, and to allow the patient to compare the present pain with what he felt before the friction. We shall often find that the pain has been removed; but if any degree of neuralgic sensibility remains, the friction must be repeated until the peculiar sensations show themselves, and the pain will then probably cease. Should it still be obstinate, the patient must persevere with the friction until it is removed. The ointment recommended, is sufficiently powerful when the pain extends through all the branches of the fifth pair, but a stronger one may be required when it is confined to one spot; we may then take forty grains to the ounce. It is well to add the important caution, not to introduce the smallest portion of the ointment into the eye.[1] I had an opportunity of observing the palliative effect of the veratrine ointment in the case of a widow of fifty-three years of age, who for three years had suffered from neuralgia of the supraorbital and infraorbital nerves of the right side, without deriving any benefit from the various modes of treatment pursued; the veratrine ointment was beneficial at first, but, after three months, its effect was entirely lost, and I have since repeatedly made the same observation. Of late, aconitine has been recommended. Sir Benjamin Brodie had noticed that chewing the leaves of aconitum napellus caused a numbness in the lips, continuing for several hours. The alkaloid, which requires much care in its preparation, and is expensive, has proved effectual in several obstinate cases; it is used as an ointment, made with one grain of aconitine to an ounce of adeps, of which one third is to be rubbed into the neuralgic part two or three times a day. In the case of a London surgeon, who had for eight years been affected with violent neuralgia of the third division, this remedy removed it after inducing a numbness which lasted for twelve or eighteen hours; and the neuralgia had not returned at the patient's decease, which occurred six years later. Dr. Watson[1] mentions a few more cases in proof of its efficacy. The most recent suggestions for the palliation of the pain, are the inhalation of ether and chloroform. We do not as yet possess any scientific observations as to its effect in facial neuralgia.

---

[1] Forcke, Physiologisch-therapeutische Untersuchungen über das Veratrin, 1837, p. 47.

For the radical cure of tic douloureux, we are directed to attend first to the removal of the exciting cause; and if this be insufficient, to make a direct attack upon the nervous affection. There can be no doubt that whenever we are able to ascertain or even to surmise a cause, the rules of practice demand that it should be first looked to. The physician will only be too glad to have something to hold by, and will be justified in expecting a beneficial result from the repeated use of the warm mineral waters; in derangement of the portal system, or, where there is a rheumatic constitution, Marienbad is to be recommended; Carlsbad or Marienbad would prove effectual in confirmed hepatic disease. The second alternative is most unsatisfactory; we should scarcely be expected, in any other branch of science, to attack a thing that we do not even know.

The most immediate cure was supposed to lie in a direct attack upon its seat by destroying the conducting power of the nerve. This idea was first carried into practice by Maréchal, a surgeon of Louis XIV, who divided the nerve. The value of this method and of the excision of a portion of the nerve, is at once determined by the neurophysiological law of eccentricity; according to which the central end of the divided nerve, if only the hundredth part of an inch in length, when irritated, causes the pain to be felt down to its extreme cutaneous distribution. It is only in morbid affections of facial branches of the fifth pair that operative interference could induce a hope of success, as in the case observed by Jeffrey; but unfortunately these cases are extremely rare. The decline of the surgical procedure is strong evidence against its value. But to apply it to the facial nerve, as some have suggested, is a great error, for this would increase the unhappy condition of the patient, by superadding to his sufferings the distortions resulting from paralysis of the motor nerve.

---

[1] Lectures on the Principles and Practice of Physic; 2d edit., 1845, vol. i, p. 695.

Among the local remedies by which it was supposed that the affected nerves were directly attacked, we must mention issues made by means of the actual cautery, as especially recommended by André. Although his view, according to which the nerve is destroyed, or the materia peccans allowed an exit, would not meet with much support at the present day, we must not forget that by irritating peripheral nerves, the state of the central organ may be altered. The results obtained by the application of an ointment of biniodide of mercury, (℈j to ℥j of lard,) as recommended by Scott,[1] must be explained upon this theory. Magendie has recently suggested the use of galvanism for the cure of facial neuralgia, and has detailed a few cases in evidence of its value. He introduces a very firm platinum needle into the painful nerve, and passes galvanic currents through it.[2] The effect is not permanent, and two of my patients complained of an increase of pain after the employment of electro-magnetism. Compression deserves to be more extensively tried. Earle[3] gives the case of a smith, who for some time had been subject to violent pain in the frontal nerve whenever he exerted himself. He invented an apparatus, composed of springs, protected by little cushions, by which he compressed the temporal artery, and was thus enabled to work all day long at the anvil. Compression of the corresponding carotid might also be useful.

A few specific remedies have been suggested for internal administration in tic douloureux, either upon hypothetical grounds, or for reasons of an analogical character. Thus Fothergill selected conium on the supposition of a carcinomatous constitution; Hutchinson praises the carbonate of iron with honey, in large doses, from half a drachm to a drachm three times a day. But both remedies have failed; and with regard to the latter, there must have been an error at the bottom, as sympathetic, and especially hysterical affections of the fifth pair, had evidently been mistaken for the disease in question. This is confirmed by Mr. Hutchinson's statement, (assuming that it deserves credit at all,) that within two years he had met with 200 cases of the affection in his practice. The united testimony of various observers agrees in according to arsenic the chief place among metallic preparations; but it will not do to rest contented with such timid doses as might be worthy of an homœopathic quack. It must be exhibited in increasing doses, from three to ten drops of Fowler's solution, two or three times daily; it should be persevered in until the toxic effects show themselves, in sickness, a sense of fainting, formication in the toes and fingers, dryness of the fauces, and white tongue; then a pause should be allowed, and the solution be resumed as soon as those symptoms have subsided. No medicine has met with so much prejudice as arsenic; many practitioners object to $\frac{1}{10}$th of a grain—about the quantity contained in three drops, whilst they exhibit no fear of the deleterious effects of strychnine. The injurious influence of arsenic upon the reproductive system has been made a bugbear: the English reckon it among the tonic metals, and my own experience leads me to assert, that in the numerous and various diseases in which I have of late years employed arsenic, I have invariably seen an improved digestion, as marked by a better appetite, and have never observed any injurious consequences result from its use. I have repeatedly used nitrate of silver with good effect, but without permanent success. Small doses do not, however, suffice; it is necessary to give one grain and more. Those who have weighed the value of therapeutic observations in this disease, will pardon my not giving the particulars of other modes of treatment. My veneration for Sir Charles Bell's name, induces me to allude to his recommendation of croton oil, which this great man has adopted on the ground of the connection between intestinal affections and neuralgia. A poor carpenter, whose tortures reduced him so much, that he might have served as the painter's model for the last man, had employed the ordinary remedies in vain, when he applied to Sir C. Bell, and received from him the following prescription:

---

[1] Cases of Tic Douloureux and other forms of Neuralgia; London, 1834.

[2] Leçons, &c., pp. 125 and 238.

[3] Medico-Chirurgical Transactions, vol. vii, p. 187.

℞. Ol. Croton, gtt. j;
Pil. Col. Co., ʒj. Misce fiant pilul., xij.

℞. Pil. Galb. Co., gr. v, No. xii.

One of the former and two of the latter to be taken at bedtime. The pills operated quietly and powerfully. The pain subsided, and sleep returned. After a few weeks the patient returned cured, and continued free from neuralgia until his death, which occurred four years after. Mr. Shaw found the brain and the fifth pair normal; but there was an ulcer in the ileum. The same remedy was found effectual in several other patients, though it is not stated whether the result was permanent.[1]

The repeated employment of sea baths, especially in warm climates, also promises satisfactory results; the continued application of cold, in the shape of affusion of the head and spinal column, as well as of the whole body, is also advisable.

Not only the external and internal surfaces of the face are supplied with cutaneous nerves by the fifth pair, but the membranous expansions of the organs of sense also receive, by its medium, their sensitive endowment, which essentially differs from the special function of the organ. This difference is well marked in the hyperæsthesiæ, and another circumstance is observed which is of physiological interest; it is the excitement or modification of pain by the irritation of the special sense itself, of the eye by light, the ear by sound, and so on. A peculiar relation to the nerve of special sense is thus established, the action of the latter being in this way interfered with by the pathological condition of the nerve of sensation.

---

[1] The Nervous System of the Human Body, 3d ed., London, 1844, p. 355; and Practical Essays, p. 84.

CHAPTER V.

CILIARY NEURALGIA.

PAINFUL sensations in the eye, which are generally confined to one side, and are excited or increased by rays of light and by visual efforts, are the characteristic symptoms of this affection. In the higher degrees photophobia is present; this is therefore the term generally applied to the affection. The patient avoids solar and artificial light, as the bulb of the eye becomes painful when exposed to their influence, and the eyelids contract painfully. The pupil is contracted. The pain not unfrequently extends over the head and face. The eye generally weeps and becomes red. These symptoms occur in paroxysms, of a uniform or irregular character, and isolated or combined with facial neuralgia and hemicrania.

These phenomena have been attributed to an affection of the optic nerve, though unjustly, as this nerve is incapable of receiving any other impression but that of light and colour, and its hyperæsthesia is manifested exclusively by luminous phenomena, as its anæsthetic conditions show themselves by an inability to perceive light and colour. The optic nerve has nothing to do with the tactile sensation of the luminous rays; the possibility of a doubt on this subject is removed by the observation, that amaurotic individuals may suffer from photophobia.[1] The disturbance in the functions of the optic nerve occurring in ciliary neuralgia, proves the close relation that exists between the sensory nerve of the organ of sight and the special nerve of vision; this relation is equally demonstrated by the anæsthesiæ. A few ophthalmic surgeons have observed a distinct neuralgia of the lachrymal branch, which is said to show itself by darting pains in the region of the lachrymal gland, and by photophobia and sensitiveness of the eye, and by periodic weeping.

Scrofula is the main cause of ciliary neuralgia; it is also brought on by discharges, especially seminal emissions, by helminthiasis, anæmia, and hysteria; the development of puberty, the exanthemata, measles, and scarlet fever, malaria, (the so-called intermittent ophthalmia in the main belong to this class,) extreme exertion of the eyes by fine work in a bright light, the combined fatigue of the eyes and of the mind, predispose to the complaint; want of exercise of the eyes, and withdrawal of the healthy stimulus of light, less frequently give rise to it.

---

[1] See the Description of Optic Anæsthesia.

A cure is difficult to be obtained, because, as in all affections of the organ of vision, the mind constantly dwells upon the disease, and thus a complete ophthalmic hypochondriasis results.

The therapeutic proceeding should be more of a dietetic than a pharmaceutic character. The influence of light must not be removed, but modified, unless the former is rendered imperative by a complication with other diseases of the eye. A rapid change of light must be avoided. The eyes should be protected by shades, broad brims to the hats or caps, or by blue spectacles. Variety in the mode of exercising the organs is desirable: people who are accustomed to work, requiring a close proximity of the objects to the eye, should exchange it for an occupation allowing a long range of vision; looking upon green fields, residence in pure dry air, the use of the cold bath, and sponging, are also beneficial. If there be a scrofulous taint, brine and sea baths and cod liver oil are advisable; if debilitating causes are to be traced, chalybeate medicines and baths are to be recommended. The debility of irritation indicates the propriety of washing the head with cold water, and of undergoing a course of whey.[1] If there is plethora or congestion, blood may be taken by cupping at the nape of the neck, or by leeches applied behind the ears. Irritating and heating local applications should be entirely avoided. Jüngken[1] is strongly in favour of the cold eye-douche, especially with water impregnated with carbonic acid gas, which he orders to be applied twice a-day for half an hour each time. Several cases which resisted every other mode of treatment, were cured by the application of pure carbonic acid gas. If there be an intermittent type, quina and arsenic are indicated.

---

[1] [Whey cures are extensively resorted to in different parts of the Continent, though more especially in Switzerland, and some mountainous districts of Germany. They are systematically carried out in Spring and Summer. Patients commence by drinking small quantities of whey, which are gradually increased, and are taken the first thing in the morning, cold or tepid. The duration of the course generally lasts about six weeks. Much exercise is taken, and a simple unirritating diet is prescribed. Whey cures are recommended in numerous constitutional disorders of a cachectic character, and in inveterate cutaneous disorders; the whey is prepared in various ways, with alum, tartrate of potass, wine, or tamarinds, and is ordered alone, or in conjunction with mineral waters, according to the requirements of the case.—Ed.]

---

[1] Die Lehre von den Augenkrankheiten, 2d edit., p. 812.

CHAPTER VI.

NEURALGIA OF THE LUMBO-SACRAL PLEXUS.

It is no proof of the progress of observation, that till very recently sciatica has been looked upon as the sole representative of neuralgia of the inferior extremities, nor has the affection even been faithfully described. Daily experience shows that there is no cutaneous nerve of the lumbar and sacral plexuses, from the arch of the pubis to the tips of the toes, which may not be affected by neuralgia; but the traditional account of a pain following the course of the trunk of the nerve, obscures the judgment, and the absence of an accurate diagnosis is disguised by conventional terms, as rheumatic pains, lumbago, and the like.

The lower portion of the lumbo-sacral plexus is more frequently affected with neuralgia than the upper portion, and pains occur more frequently in the course of the sciatic than of the crural nerves. We will therefore discuss the former first.

NEURALGIA ISCHIADICA.

SYNON.—*Ischias nervosa postica Cotunnii—Sciatica.*

The chief feature of this malady is pain in the distribution of the cutaneous branches of the sciatic nerve; it varies according to the seat and number of branches affected. If the posterior, middle, or lower cutaneous nerves, as often happens, are the seat of neuralgia, the posterior or lateral surface of the thigh is the suffering part, the pain extending to the popliteal space and the calf of the leg. The superficial branch of the peroneal nerve is less frequently affected; in this case the pain extends down the external and anterior surface of the leg, and along the external and inner half of the dorsal surface of the foot. The long cutaneous branch of the tibial nerve is more often involved; the pain then shows itself at the external malleolus and the outer edge of the foot. The plantar nerves are rarely affected, excepting the external tibial nerve, which supplies the heel.

The pain darts though these parts with the rapidity of lightning, up and down, cutting, tearing and burning, with extreme violence, increased by slight contact, or gradually becoming permanent with a gouging or crushing character. At the same time the patient often complains of an oppressive, painful sensation in the vicinity of the tuberosity of the ischium, not far from the seat of the sciatic nerve, and of pains in the sacrum. At times the sciatic pain rivals that of facial neuralgia. Lentin[1] mentions a patient in whom the ball of the right foot was the seat of pain; a slip of paper falling upon the ball, though covered with the stocking, excited the pain for several hours. The pain is most violent in plantar neuralgia, of which I have lately seen an instance in a woman of fifty-four years of age; her sufferings quite equalled those of tic douloureux. Hugh Ley[1] quotes two similar cases; and Descot[2] communicates one observed by Richerand,[3] in which the application of the actual cautery to the sole of the foot proved effectual. The latest edition of Bell's[4] works contains a case in which agonising pains occurred in the sole of the foot, against which the most powerful remedies were of no avail. Bell examined the patient a few days before his death, and discovered a hard tumour in the popliteal space lying in the tibial nerve, and originating in external injury. In addition to the cutaneous pain, the patients frequently complain of other abdominal sensations, such as a sense of cold, heat, itching, horripilation, or cold affusion.

Sciatica occurs in paroxysms varying in duration with a remittent, but rarely with an intermittent type. At the commencement of the disease they are more crowded together, later on they are separated by longer intervals. The attacks occur towards evening and at the beginning of night, the intermissions occur in the morning hours. There frequently is a persistent dull pain or numbness in the intervals, with tenderness on pressure, especially at those parts where the skin immediately invests the bone, as at the knee, the head of the fibula, or the ankle.

---

[1] Beiträge zur ausübenden Arznei Wissenschaft, Bd. iii, p. 129.

[2] Essay on Laryngismus Stridulus; London, 1836, p. 307.

[3] Dissertation sur les affections locales des nerfs; Paris, 1825, p. 305.

[4] Loc. cit., p. 370.

This variety of neuralgia is almost always confined to one side, it is as often in the left as the right foot. It is very unusual to meet with cases of bilateral affection. Motion, especially of the leg and the foot, is impeded and painful; the patient feels as if his muscles were fettered. During the attack it is difficult to find a position by which the pain may be relieved. Some bend the limb, others extend it or vary its posture. Other disturbances of mobility also occur, such as contractions of the muscles, and especially spasms in the calves. Movement of the leg in bed, attempts to walk or stand, the concussion of coughing or sneezing, or straining in defecation, increase the pains of sciatica. The temperature of the affected side is rarely exalted; its colour is unchanged both during the attack and in the intervals. The leg becomes emaciated when it has long been kept immovable. Beyond constipation, which usually accompanies sciatica, no marked changes show themselves in the other functions, except that febricitations are occasionally observed at the commencement.

The entire duration of the disease extends from three or four weeks to several months. There is a decided tendency to relapse. It is rarely complicated with other neuralgic affections. Cotugno[1] states, that he has occasionally observed a combination with neuralgia of the ulnar nerve. The middle period of life, from the fortieth to the sixtieth year, is predisposed to it; infancy is exempt. The male sex is said by Home to be more liable to the disease than the female; I am unable to confirm his observation. It may be assumed that some endemic influence exists; for in Naples, as Cotugno states, it occurs frequently, while it is one of the rare affections in Berlin: in some parts of England (in Cumberland and Westmoreland) it is indigenous, and like all neuralgic affections, it is frequent in malarious districts.[2] Relapses are apt to be brought on at certain seasons, and especially in winter. According to Cotugno, who is the closest observer of the disease, the pains increase during the prevalence of southerly winds and damp weather, and diminish under the influence of the north wind and a clear atmosphere.

---

[1] De Ischiade nervoso commentarius; Viennæ, 1770, p. 58.

[2] Macculloch; an Essay on the Remittent and Intermittent Diseases, including generally Marsh Fever and Neuralgia; London, 1828, vol. ii, p. 124.

Intestinal and uterine affections are the most common causes of disease—such as accumulation of fæces, a wedging in of the child's head in parturition, tedious labours, the latter months of pregnancy; then we have to mention bodily exertion, the lifting and carrying of heavy weights, a heavy fall, concussion, fracture, fatigue by forced marches or long rides on horseback; rheumatism, brought on by lying on a cold damp surface when heated, by standing barefooted, sleeping against a cold damp wall, or being wetted to the skin. It may also be caused by metastatic processes arising from the sudden or gradual suppression of long-standing sanguineous discharges, especially of hæmorrhoids and menstruation, suppressed lochia, perspiration of the feet, cachectic conditions, arthritis, and syphilis.

Diagnosis.—Until very recently, pain confined to the trunk of the ischiadic nerve has been looked upon as the pathognomonic sign of sciatica. But in reality we are unable to demonstrate the course of pain in two currents coinciding with the distribution of the tibial and peroneal nerves. In the case before us, as elsewhere, the pain is perceived according to the law of eccentricity in the terminal points of the cutaneous nerves of the sciatic; this I have convinced myself of by careful observation. There is one point in the trunk of the nerve, however, near its point of exit from the pelvis close to the tuberosity of the ischium, where the patients generally feel a fixed pain coincidently with the pain in the subcutaneous branches. This symptom resembles what occurs in administering a blow to the trunk of a nerve, for instance of the ulnar, when, in addition to the sensations in the extremities, a severe pain is felt at the point of injury, and of which no satisfactory explanation has yet been given.

Neuralgia of the sciatic must be distinguished from sympathetic affections of the nerve which frequently occur in hysterical subjects, or accompany morbid changes of the rectum or strictures of the urethra. The proper diagnostic appreciation of sciatica has been impeded by attending exclusively to the course of the sciatic nerve. Here, too, the definition of a peripheral nerve was limited to its superficial distribution, and that part which is concealed in cavities and passages was overlooked. If we except the rare cases of sciatic neuritis resulting from injuries or ulceration of the thigh, that part of the nerve which lies within the pelvis in the lumbar and sacral plexus and near the spinal cord, is the one which, on being subjected to irritation, produces the neuralgic symptoms in the leg, according to the law of eccentricity. To this circumstance we must attribute the sympathetic affections and the implication of motility. The pain in the sacrum, which is commonly present, must be interpreted in this way; the affection of the motor fibres, which are in juxtaposition with sensory filaments in the sciatic nerve, and are generally subjected to the same influences, shows itself in the spasm of the calves, in the tremor of the muscles, and in the impaired motility. These phenomena are very palpable in a difficult labour, when the sciatic plexus is dragged and irritated by the head of the child. The parturient female feels the cutting, penetrating pain, not only in the sacrum, but in the thighs, the calves and the toes, according as the sciatic cutaneous nerves are irritated, one or more, in the pelvis. At the same time there are painful muscular contractions, especially of the gastrocnemii. The irritation of the sciatic nerve may be so considerable, as to leave an enduring affection, which threatens danger after the birth of the child. I have had occasion to observe three such cases. Valleix[1] has described a similar case, in which permanent lameness of one foot ensued. As we have no dissections, it cannot be positively determined, but it may be assumed, that in these cases neuritis had taken place in the compressed plexus within the pelvis.

In the cases which I have observed, the disease only affected one leg, and commenced both with pain and deranged motility. In one female the leg was convulsively thrown up, and there was violent pain; in all three the power of movement was impeded. The pain raged both in the thigh and in the calf, and with particular violence in the toes and the sole of the foot. Although neither the temperature was increased, nor swelling or tumefaction were present, a gentle touch sufficed to raise the pain to the highest pitch, for which reason the patients maintained their foot in one position, and implored their friends not to touch them. The pains were accompanied by high fever, with a pulse ranging at 120—130, with sleeplessness and constipation, diminution and suppression of the lochia, and there were evening exacerbations.

---

[1] Traité des Neuralgies, p. 591.

Under suitable treatment, the violent pains and the fever yielded after a fortnight, but the convalescence was tedious. In all three cases the sensibility and motility of the affected leg remained affected; in one woman there was anæsthesia of the sole of the foot, so that she did not feel the insertion of a needle; in the two others, a troublesome sense of weakness continued when the foot was moved and fatigued. Two of these patients were women of the lower orders, and had been delivered with the forceps by an inexperienced person, and they were attacked by the pain within forty-eight hours. The third, a delicate lady of twenty years of age, was delivered by one of our most experienced accoucheurs with the forceps, and was seized with the affection on the tenth day.

Sometimes it is easy, at others difficult, to distinguish sciatic neuralgia from other painful affections of the leg; it is not easy to confound it with acute rheumatism, or with gouty pains. In regard to coxalgia, the local symptoms in the joint and trochanter, and the alteration in the length of the limb, have been supposed to offer the diagnostic marks. Irrespective of the difficulty of forming a diagnosis when the two conditions are complicated,[1] and of the fact, that the hip affected by sciatica may appear shorter than the healthy one, owing to muscular contraction, there is no doubt of the existence of diseases of the joints, which must be classed with neuralgic affections. These have been first carefully described by Sir Benjamin Brodie.[2]

The symptoms often point to the hip-joint; the patients have pain in the hip and knee, which is increased by pressure and movement, and causes the limb to be maintained in a fixed position. The pain is not confined to one spot, but extends over the whole thigh; the cutaneous coverings are more tender than the deeper seated parts; the patients complain more when the skin is raised and pinched, than when the head of the thigh bone is forcibly pushed up against the acetabulum. If the attention of the patient happens to be directed to the examination, the latter may seem to increase the pain; but if an animated conversation be kept up, the operation scarcely produces an impression. There is no atrophy of the glutæi muscles, nor a flattening of the corresponding side of the nates: the entire aspect of the limb differs from that seen in the disorganisation of the joint. At times there is swelling of the thigh and the natis, and in rare cases even a circumscribed swelling is met with, but no abscess presents itself, no fluctuation occurs, and we cannot compare the phenomenon with anything more appropriately than with an unusually large wheal of urticaria. Although no deformity occurs by flattening of the natis, it is not unusual to meet with an arching of the pelvis backwards, which at the same time is raised on the diseased side, so as to form an acute angle with the spinal column instead of a right angle; this causes an apparent shortening of the limb, and the heel does not touch the ground when the patient stands up; this results from the predominating activity of certain muscles, and the yielding of the parts to abnormal positions. A remarkable alternation of heat and cold occasionally takes place, not only in the hip-joint, but also in the entire limb. In the morning it is cold, pale, and livid, in the afternoon warm, and in the evening hot, with gorged vessels and a shining surface. Spasmodic attacks in the muscles of the affected limb are not unusual. Convulsive movements follow a pinch or very slight touch of the integuments, which resemble the movements of chorea; sometimes the limb is violently thrown up by spasms. In these cases, there is always a sense of weakness, which predominates after the pains have ceased,—such a condition may last for weeks, months, or years, without any further evil consequences. The patients are almost always of the female sex, and rarely above the age of puberty; they generally suffer from irregular menstruation, and possess an hysterical constitution; hysterical fits precede or follow, and the two affections thus afford mutual alleviation and relief. At times a serious illness has preceded, which has left great exhaustion, or the patient may have laboured under depressing mental influences.

---

[1] Rust; über-die Verrenkungen durch innere Bedingung, p. 53.

[2] Lectures illustrative of certain local Nervous Affections; London, 1837, p. 34.

Our *anatomical knowledge* of sciatica has remained defective for the same reasons that have prevented the improvement of the diagnosis. Attention has only been directed to the course of the sciatic nerve in the thigh. But, with the exception of the rare occurrence of neuritis, or of the thickening and induration of single nervous branches in the vicinity of old ulcers, or of the painful tubercles, the cases that have hitherto been examined, have presented no alternation of any consequence, in the course of the nerve along the leg, even where the disease had lasted a long time. Thus in an old woman aged 87, who had been troubled for more than forty years with sciatica, the sheath of the nerve was found to be of rather looser texture than in the normal condition, and the veins in the upper part of the nerve were varicose. Bichat[1] also found the same varicose distension of the veins in one of his patients. We even meet with fictitious post-mortem results; and it is customary in this matter to refer to Cotugno. We allude to the accumulation of serous fluid in the sheaths of the sciatic filaments. The post-mortem in question was so little satisfactory to the celebrated Neapolitan physician, that he observes: "Sed quin haec dissectio mihi pro eo ac voluissem satisfaceret, plurima obstitere;"[2] and at another place he pays no attention to it; for he says distinctly, "Quem (sc. nerv. ischiadicum) etsi fors non tulerit unquam in ischiadici cadavere investigare, *quod hac ischiade peremtus nemo nobis occurrerit* nunquam tamen dubiam morbi sedem stabilivisse putavi." (p. 11.) The case was one of a man who had previously suffered from sciatica, and died of typhus fever: there was œdema of both legs; the sciatic nerve of the affected side had alone been examined, and was found rather darker in colour. The sheath was thicker than it is normally, and from the middle of the tibia downwards, it was filled with a serous fluid; as putrefaction had already commenced, the other sciatic nerve was not examined, so that not even a comparison could be instituted. We cannot supply the deficiency in the morbid anatomy of this disease, except by a more comprehensive examination of the entire course of the sciatic nerve. Whenever the rare opportunity is offered of examining a person who has died of sciatica, the peripheral distribution of the sciatic nerve in the pelvis, in the lumbar and sacral plexus, and in the spinal canal, should be investigated, as well as the spinal cord itself. Nothing less than this will suffice.

[1] Dictionnaire des Sciences Médicales, vol. xxxv, p. 504.

[2] Loc. cit., p. 67.

In the consideration of the prognosis of sciatica, we must remember the great proclivity to relapse, and the possibility of a supervention of paralysis. We do not possess many instances of complete recovery; an increased sensibility, or a dull sense of numbness, generally continues for a considerable time in the affected leg.

A spontaneous cure takes place in the shape of resolution, or with critical symptoms, such as diarrhœa, menstrual, lochial, or hæmorrhoidal discharges. Sciatica rarely alternates with other neuralgic affections.

Treatment.—The point to which we must first direct our attention is the examination of the relation existing between the blood and neuralgia. The sudden occurrence of sciatica in a plethoric individual, not rarely induces a febrile and even an inflammatory condition, of which Cotugno has made a distinct inflammatory stage; it is the more likely to be developed where a menstrual or hæmorrhoidal discharge has been suppressed. The treatment to be adopted in this case must be antiphlogistic. If the inflammatory character is well marked, venesection is required, and may be repeated; the older authors have advised its performance on the foot of the affected side. If there are not sufficient grounds for this proceeding, local abstraction of blood, by cupping or leeching the lumbar and sacral region, or the anus, may suffice.

We have first to attend to the cause of the disorder. Especial regard should be had to the organs of the pelvis. Thus we not unfrequently meet with large accumulations of fæces in the intestinal canal, whose removal is coincident with the abatement of the neuralgia. If the uterus is at fault, owing to the child's head being impacted, parturition must be accelerated; if an inflammatory intumescence of the organ remains, local abstraction of blood becomes necessary. In the cases which I have just related, I ordered the application of leeches to the iliac region, and to the lumbar vertebræ with much benefit, followed by inunction with Ung. Antim. Tartar., and large doses of opium, with mild purgatives.

The remedy recommended by Dr. v. Basedow,[1] for the sciatica pains, which not unfrequently remain, even after easy births, is the application of a roller to the leg from the toes to the poplitæal space, to be repeated as often as the pain recurs.

---

[1] Wochenschrift für die ges. Heilk. Jahrg., 1838, p. 636.

Metastatic and cachectic states must be treated according to the ordinary principles of therapeutics. The curative powers of mercury, where there was a syphilitic taint, may have given rise to the laudation which calomel has enjoyed in the treatment of sciatica. Fothergill[1] advises the exhibition of a pill, containing one grain of calomel, at bedtime, immediately followed by a draught, containing thirty drops of Antimony wine and twenty-five of Laudanum. If an effect is manifested rapidly, the dose of calomel is to be raised to two grains on alternate nights; if the pain is abated, the antimony and the opium are to be omitted. Fothergill assures us that he has rarely met with genuine sciatica (and we must say, he was peculiarly fortunate in this,) which did not yield to this method in a few weeks, and that he has rarely observed a relapse.

Where there is a rheumatic predisposition, colchicum, cod-liver oil, and above all, iodide of potassium, are to be recommended; for several years past, I have had repeated opportunities of noticing the rapid effect of the latter remedy, when given in doses of three, five, or ten grains, three times a day, in an aqueous solution. Graves[2] also praises the rapid powers of this remedy, having had occasion to try it on himself when suffering from a violent attack of sciatica. In obstinate cases, we may anticipate good results from the Russian or vapour bath and the steam douche, from the use of the warm baths and douches of Wiesbaden, Teplitz, Landeck, Warmbrunn, and Baaden.

In hysterical neuralgia of the joints, as described by Brodie, we must remember that hysterical attacks not unfrequently disappear suddenly without any appreciable cause of their cessation, and that recovery often takes place, in consequence of a powerful impression, of whatever character, made upon the nervous system. It is thus that things the most opposite obtain the reputation of being powerful remedies, influences both of a moral and physical nature. It is necessary to avoid the abstraction of blood and debilitating remedies, but especially issues and counter-irritants, which keep up the attention of the patient to his local malady.[1] Travers recommends bandaging the affected limb. Indolent rest is to be avoided. Thorough improvement therefore rarely occurs so long as the patient is confined to her bed. The pain may be relieved, but a sense of weakness follows, which is a greater impediment to walking than the pain itself, and increases the longer the patient occupies the recumbent position. In reference to the general treatment, I refer the reader to the Chapter on "Hysteria."

---

[1] The Works of Dr. Fothergill, edited by Dr. Lettsom, vol. ii.

[2] A System of Clinical Medicine, p. 866.

If the pain continues unaltered after we have conscientiously sought to remove the cause, or if, as is often the case, we are unable with certainty to ascertain the cause, we must make an attack upon the neuralgia itself by means of certain remedies which appear to act by derivation or translation. Among these remedies the oleum terebinthinæ rectificatum, (sive æthereum, spiritus terebinthinæ,) has obtained the greatest reputation; it was first recommended by Cheyne,[2] in the year 1722, and was employed with great success by Francis Home,[3] and in modern times by Recamier and Martinet.[4] My own experience leads me to confirm this praise; I have not observed such rapid alleviation and cure to follow any other remedy as this one, though I cannot deny that I have found it ineffectual occasionally, nor have I found Martinet's assertion confirmed, that the specific operation of the oil of turpentine is manifested by a sense of warmth extending from the intestinal canal to the entire distribution of the diseased nerve, and by occasionally producing local perspirations. It should be given in a dose of from fifteen to thirty drops, and the most suitable form is the electuary, as in the following prescription:

℞. Ol. Terebinth. rectif., ʒj;
    Syr. Aurant. sive Mellis, ℥ij.
M. Sumat æger cochleare amplum bis die.

The internal exhibition may be associated with its external application, by friction of the leg. Next in order to the oil of turpentine, arsenic (in the shape of Fowler's solution, increasing the dose from four to ten drops,) deserves to be employed in inveterate sciatica.

---

[1] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 272.

[2] On the Gout, § 71.

[3] Clinical Cases and Reports taken in the Royal Infirmary, Edinburgh, as delivered at the Clinical Lectures, &c., 1776-7.

[4] Mémoire sur l'emploi de l'huile de Térébenthine dans la sciatique et quelques autres nevralgies des membres; Paris, 1823.

Another substance recommended on account of its specific action against sciatica, is the alkaloid of the veratrum sabadilla,[1] used chiefly externally in the shape of an ointment—

R. Pulv. Veratrin, ℈ss—gr. xv;
Adipis suilli, ℥j.

Of this, a portion the size of a hazel nut is to be rubbed into the thigh until a sense of numbness and pricking is produced. In the cases which I have hitherto observed, I have not found the efficacy of veratrine in sciatica confirmed.

The skin and intestinal canal have from time immemorial served for derivation and counter-irritation. Greek and Arabian physicians applied the actual cautery in the vicinity of the painful part. Cotugno deserves the merit of having recommended blisters in the treatment of sciatica, although his views which are based upon a doctrine of humoral pathology, that the artificial ulcers possess an attractive power, and thus draw out the fluid stagnating in the sheath of the nerve, is not likely to be adopted in the present day. Those parts of the leg are selected for the application of the blister, where the nerve is most superficial, as the head of the fibula, and a point four inches above the outer ankle. The emplastrum cantharidum should be spread upon a piece of linen four inches in length and four broad, and applied to the external side of the knee, like a garter. The ulcer is to be kept open for some time, though not too long; it is better to repeat the application. The secreted fluid is often unusually acrid and viscid. This method, which may be advantageously combined with endermic applications, has been followed with good results in several of my cases of inveterate sciatica, although they were not so rapid as Cotugno has observed them. Valleix is more in favour of flying blisters applied at different points than of maintaining a discharge from the blistered surface.

In these times of hydropathy it is necessary to warn against the abuse, or even against the use, of cold applications in sciatica; I have repeatedly observed the pains to be considerably and permanently increased by cold humid envelopes.

---

[1] Ebers, das Veratrin und seine Wirkungen nach eignen Erfahrungen, Wochenschr. für die ges. Heilkunde, 1835, p. 789.

The counter-irritation to the rectum by means of acrid enemata, which was in use in former times to the extent of producing an inflammatory reaction, has deservedly fallen into oblivion; yet it is not long ago, that enemata with one ounce of oil of turpentine have been recommended to be exhibited once or twice a day in obstinate sciatica.[1]

To palliate the pain nothing is more suitable than the endermic application of acetate of morphia, from one quarter to one third, or half a grain, which on the occurrence of the pain is to be strewed upon the blistered surface. Marcet[2] praises the extract prepared from the seeds of the datura stramonium, from a quarter to half a grain three times a day; Cotugno is in favour of the employment of opium in clysters.

Change of air or residence in a different locality often produces permanent good results.

The diet should be bland, and spirituous liquors and spiced articles of food are to be avoided. The patient should not lie on a feather bed, but on a mattress. Both active and passive exercise of the foot is to be recommended during the intervals of the pain.

To combat the paralysis which may remain, we must have recourse to stimulating frictions, to electro-magnetism, to the douche, to sea, brine, and chalybeate baths, to the mineral waters of Gastein and Wildbad.

NEURALGIA CRURALIS.

SYNON.—*Ischias nervosa antica Cotunnii.*

This variety of neuralgia is characterised by pain at the anterior and inner side of the thigh, and at the knee in the course of the upper cutaneous branch of the crural nerve (nervus saphenus minor); it rarely extends along the course of the internal saphenus nerve down to the dorsum of the foot, and the great toe.

Derangement of motility which generally is associated with the complaint, affects the thigh, and impedes or prevents the flexion or extension of the limb.

---

[1] Ducros; Lancet, Feb. 17, 1838.

[2] Medico-Chirur. Transact., vol. vii, p. 550.

Crural neuralgia is met with much more rarely than sciatica, with which in other respects it shares the same symptoms, nor does the etiology of the two affections differ much. Thus the pelvic viscera, and especially the intestine, are sometimes at fault, of which the following case, given by Portal,[1] affords an illustration. A lady, who had a considerable curvature of the spine, was attacked three or four hours after dinner by very violent pains in the great toe of the left foot; they continued for a longer or shorter period, and generally ceased after a copious motion. The pain was rendered more intense by enemata until they were discharged. After her death, which was caused by a malignant fever, the lower false ribs of the left side were found curved in the iliac region, in such a manner as to compress the sigmoid flexure; owing to this, the fæces which were impeded in their passage acted upon the nerves of the lumbar plexus. Thus the affection of the crural nerve was produced, and manifested itself along the course of the internal saphenus nerve, and following the law of eccentric action, showed itself in the foot. Dr. Kilian has observed a case of crural neuralgia, which was brought on by an extensive reticular cancer of the sacrum. In a female of twenty-seven years of age, ten months before being seen, boring pains had presented themselves in the sacrum, after a fall from a considerable height upon this bone; they extended into the hips and thighs, and soon after impaired the mobility and power of walking. The right leg became the seat of violent intermitting pains, which returned in regular paroxysms every evening about ten o'clock, and lasted uninterruptedly till five o'clock the following morning. They commenced at the crural canal, and extended indefinitely over the entire extremity without any limitation of the parts. By day the patient only complained of sensitive points near the crural canal, in the vicinity of the internal condyle of the knee, and of the inner malleolus. The sensitiveness of these points amounted to pain on pressure being applied; every evening it increased and extended until at last the whole leg was painful. This process took place with such rapidity that the patient was unable to indicate the direction in which the pain extended from the tender points. During the attack, the colour of the skin was unaltered, there was no turgor or collapse, the muscles were not contracted nor spasmodic; after some time the pains remitted, quitting the thigh, and gradually advancing to the extremity of the limb. At last, they also disappeared from here; it was unusual for another attack to occur; when this was the case, it seemed to result from a larger accumulation of fæces in the colon, for relief was immediately obtained by a free evacuation following the use of an enema. After an intermission of two months, a fortnight before her death, pains occurred in the sacrum, and not only in the right, but also in the left leg; secondary peritonitis ensued, which in twenty-four hours terminated fatally. A carcinomatous tumour was found to occupy the entire sacrum from its junction to the os coccygis, to the promontory; it was developed from the interior of the bone, had burst the anterior wall of the sacrum, and filled the entire pelvic cavity. The tumour presented various grades of development and consistency. The part adjoining the os coccygis was very hard and consistent, whilst the vertex of the tumour was perfectly soft, and contained several cavities varying in size, and filled with coagulated blood or the sanies of carcinoma. On the right side, there was at the upper part a perforation of the size of a pea, through which the contents of the tumour had been discharged into the abdominal cavity, between the coils of the small intestines. The small intestines were all pushed upwards, and the sigmoid flexure which passed down by the side of the tumour, was filled with hardened masses of fæces. The trunk of the right crural nerve was pushed a little forwards, otherwise it appeared normal. The vertebra ceased abruptly at the promontory, so that it was easy to introduce a finger from the pelvis into the patulous spinal canal.[1] Mayo[2] relates a case in which such intense pain affected the knee of a female that it was thought necessary to perform amputation of the thigh; it was ineffectual, for the pains continued. The patient died a few years later, and on dissection the posterior surface of the spinal cord was found covered with cartilaginous and osseous laminæ.

---

[1] Cours d'Anatomie Médicale, vol. iv, p. 276.

---

[1] Henle's und Pfeufer's Zeitschrift für rationelle Medicin; B. vi; I.H., 1847, s. 24.

[2] Outlines of Human Pathology, 1836, p. 83.

Crural nuralgia, like sciatica, occurs in hysterical subjects, and if carelessly examined may be taken for an affection of the joint. The knee is very tender, but more sensitive to a pinch of the skin than to pressure: this sensibility extends some distance from the joint both upwards and downwards, the patient when examined, suffers less as soon as her attention is directed to these objects; nor does she complain much when the articulating surfaces of the tibia and femur are pressed together, provided movement of the joint itself be avoided. Generally, the leg is kept in the extended position, whilst in articular disease the knee is bent. Weeks, months, and years may thus pass away, and the knee still retain its natural form and size. Only occasionally a trifling swelling is perceptible at the anterior surface above, and to the side of the ligamentum patellæ; this must not, however, be confounded with a general tumefaction of the knee-joint, as it is the consequence of improper treatment by means of counter-irritation.[1]

Neuralgia of the upper cutaneous branch of the crural nerve is associated sympathetically with coxalgia, and is manifested by pain in the knee (gonalgia,) rendering every movement of the thigh, and especially the extension of the knee, difficult; in part it prevents it altogether, and rages chiefly at night.[2] The knee is so tender that the slightest touch is insupportable. Rust states, that the pain only accompanies the first stage, that of elongation of the femur, and that it arises from tension of the muscles and nerves. According to Stromeyer,[3] it occurs both in that stage of elongation and shortening of the femur; he asserts that it takes place whenever the hip-joint is maintained bent by a tonic spasm of the psoas and internal iliac muscles, and that therefore every attempt to extend the limb increases the pain in the knee. Stromeyer justly rejects the mechanical explanation which refers the pain to a tension of the nerves, for it is not even increased by pressure applied externally to the hip-joint. The same rules laid down for the treatment of sciatica apply in the present instance.

---

[1] Brodie; Lectures illustrative of certain local Nervous Affections, p. 40.

[2] Rust; über die Verrenkungen durch innere Bedingung, p. 37.

[3] De combinatione actionis nervorum et motoriorum et sensoriorum sive de sensuum impressionibus musculorum actione effectis; Erlangen, 1839.

No author has hitherto spoken of neuralgia occurring in the distribution of the obturator nerve, the cutaneous terminations of which supply the inner surface of the thigh. I am the more anxious to direct attention to pain in the course of this nerve, as a symptom, as it is of importance in recognising a condition dangerous to life.

The wife of a merchant, aged 50, of a delicate constitution, the mother of five children, had eight years previously induced a crural hernia of the left side, by lifting a heavy weight. Although the truss afforded sufficient protection, she was seized from time to time, by attacks of colic, accompanied by nausea, vomiting, dysuria, and violent contracting pains in the hypogastrium; the latter extended to the inner side of the right thigh, in which the patient often experienced a sensation, which she compared to cramp in the calves; she was then unable to lift up the leg; not unfrequently she had a feeling of numbness, as if the limb went to sleep. These attacks yielded to the employment of anodynes and of warm fomentations; pains of the left arm and left breast which supervened, confirmed the diagnosis of a neuralgic affection. The infusion of Tissot had been used during the last two years with good effect,—the attacks of colic ceased. An inclination to costiveness still remained, and the patient on bending down or lifting up the legs while sitting, often complained of a peculiar crunching sensation in the abdomen. In the beginning of September 1846, the colicky pains returned, but soon yielded to the usual remedies. Three weeks after they returned one evening, while the lady was taking a walk; there was a dull heavy pain in the cæcal region, which was moderately increased by touch. It was more vivid on the inner side of the right thigh, and was augmented by movement of the limb. These symptoms were accompanied by constipation which had lasted forty-eight hours in spite of purgative pills, by a peculiar painful sensation in the epigastrium, and a small tense pulse of 96 beats. The hernial regions were examined, but showed nothing abnormal. The soothing remedies formerly applied, and repeated laxative enemata, produced no effect. On the following day, in addition to the enduring constipation, eructation, dryness of the mouth, thirst, and a sense of fainting supervened. The mesogastric region was somewhat distended and tympanitic on percussion, whilst the cæcum sounded duller than usual; on the third day the symptoms demonstrated the supervention of gangrene of the intestine. The tip of the nose and the tongue became cold, the hands and the feet cool, the pulse frequent, 120 small, irregular, intermittent, the skin was flabby, and a fold pinched up on the neck was not effaced for a long time. The thirst was insatiable, and there was a constant longing for cold water; at the same time, there was a sensation at the pit of the stomach, which was more overpowering than the most violent pain. The patient described it as a dissolution of life; there was slight transitory drowsiness, the eyelids remaining half open and the eye-balls being turned up; the costiveness was persistent, vomiting of stercoraceous matter ensued, and there was tympanitic distension of the abdomen with slight tenderness. The patient had ceased to complain of the painful sensations in the thigh. On the fourth day, the extremities were of an icy coldness, the pulse was vermicular and intermittent, there was stercoraceous vomiting, and in the night unconsciousness and death ensued.

The details which I have given of the course of the disease, renders it unnecessary to relate the treatment which the ordinary attendant of the lady, the late Dr. Horn, conducted in conjunction with myself; it was not long before we anticipated the fatal issue. I did not consider that we were justified in assuming the ileus to be due to an internal strangulation, as the attacks had formerly been frequently repeated, as well as on account of the pains in the thigh. I was rather inclined to assume a disorganisation of the cæcum, or the presence of a morbid growth behind it, which might press upon or drag the nervous plexuses of the right lower extremity, and thus give rise to the pains experienced in the skin and the muscles.

The body was examined twenty-eight hours after death, and a few points of the surface of the small intestine were found reddened, though the corresponding mucous membrane was unaltered. At a short distance from the cæcum, the lower portion of the ileum formed an acute angle at the foramen ovale of the right side.

A small coil of intestine, of the length of the third digital phalanx, penetrated the foramen, and became visible on removing the obturator and pectinæus muscles; it was strangulated by the fibrous membrane, so that it could not be replaced in the abdominal cavity though considerable traction was employed. It was only released by incising the membrane; the incarcerated coil still, however, continued to be completely separated from the remainder of the intestine. When the thickened hernial sac was opened, a small quantity of serous fluid escaped, the coats of the strangulated portion were considerably thickened, the mucous membrane presented a blackish discoloration, and the passage at the point of incarceration was so completely obstructed, that merely a thin probe could be passed. The adjoining part of the ileum, to the extent of three inches towards the stomach, was of a livid colour, the mucous membrane, gangrenous, forming a villous pulp, the muscular coat similarly disorganised, but the serous membrane unaltered; some of the mesenteric glands in the vicinity of the gangrenous portion of intestine were swollen. Where the former hernia had been, the omentum was found to form a firm chord attached to the posterior edge of the left poupart ligament. Without penetrating the inguinal or crural canal, the ascending colon adhered laterally to the peritoneum by broad transparent old adhesions.

The peculiar point of interest in this case is not its rare occurrence, but the elucidation of the diagnosis by a nervous symptom. The obturator nerve must be exposed to pressure and traction, in every case of hernia, through the obturator foramen; and, if the contents of the hernia are an intestinal coil, we shall find symptoms of *strangulation of the nerve* superadded to the phenomena of strangulation of the intestine. The sensitive fibres of the obturator nerve, which are the cutaneous nerves of the inner side of the thigh, as well as the motor fibres supplying the adductor muscles of the thigh, manifest this derangement by more or less vivid pain at the inner side of the thigh, by a sense of numbness and formication, and inability to bend the limb. In a few cases given by older observers, we find this pain spoken of as accompanying ileus, without attributing to it any diagnostic value. Thus Garengeot, who lived in the middle of the last century, and has merited well of the history of obturator hernia, relates that the first patient treated by him for this affection had fallen on her back after parturition, that the symptoms of ileus ensued, but unaccompanied by tension of the abdomen or fever. When asked whether she suffered pain, she answered that she had immediately experienced an unpleasant sensation in the abdomen, associated with a pain at the inner side of the right thigh, which continued and increased as often as she vomited.[1] Oudermann[2] relates a case which is peculiarly instructive, by the *post-mortem* account he gives; we quote the following particulars:—on the fifth day the patient had stercoraceous vomiting; she knew of no rupture, nor was anything of the kind to be found in the hernial regions. It was only during the last days of her life that she was troubled with any pain; it occurred at the inner and upper part of the thigh, descending from the inguinal region inwards and downwards; nor was any tumour to be felt even here, nor any palpable sign of a rupture. A recent valuable observation[3] contains no mention of these symptoms of incarceration of the obturator nerve; but if the absence of those symptoms is not expressly stated, their not being attended to proves nothing. Whoever is well acquainted with the anatomical relations of this hernial region, as they are now presented to me by a beautiful preparation of the pelvic fascia, by the experienced hand of my colleague Dr. Schlemm, cannot doubt of the necessary existence of that nervous symptom.

A pathognomonic symptom for obturator hernia, as presented to us in the combination of pain and impaired motility of the thigh, associated with an interruption to the permeability of the intestine, is of the more importance because this species of rupture only forms gradually. It is, in fact, a chronic complaint rarely presenting any external visible tumour, and exposed more than any other rupture to temporary and repeated incarcerations. In the female sex, in whom this variety of hernia chiefly occurs, these circumstances may easily mislead the physician to assume a nervous hysterical affection, a mistake which is only likely to be confirmed by the apparently neuralgic character of the pain of the thigh.

---

[1] *Ueber den Bruch durch das Hüftbeinloch, nebst einem seltnen Falle hierüber; Landshut*, 1823, p. 4.

[2] *Mémoire sur plusieurs hernies singulières*, in Mémoires de l'Académie Royale de *Chirurgie*, vol. i, p. 699.

[3] *Beitrag zur Diagnose* der Einklemmung der Hernia foraminis ovalis vom *Hofrath Dr.* [illegible], in *Roser* und Wunderlich's Archiv für Physiol. Heilk., 1846 5 *Jahrg.*, 3 H. S. 408

The value of this nervous symptom is not confined to diagnosis, but becomes practically useful; there is no doubt that had the nature of the disease been recognised early in our patient, she might have been preserved by an operation. "Qui sine peccato est vestrum primus lapidem mittat." Henceforth a stricter judgment will be exercised; at all events, the pure surgeons will consider the nerves with more attention and affection; it seems as if they already gratefully acknowledged the benefits conferred upon them by distinguished surgeons, of whom it is enough to quote Bell.

CHAPTER VII.

NEURALGIA OF THE BRACHIAL PLEXUS.

NEURALGIA occurs less frequently in the brachial than the crural plexus, and chiefly attacks the internal cutaneous nerve and the cutaneous branches of the ulnar and radial nerves. Nor have I here observed a radiation of the pain in the course of the nerve, but have heard the patients complain of periodical shocks and starts of pain, especially in the ramifications supplying the corresponding fingers. The patients almost invariably complain of a sense of numbness like that which is well known to be produced by striking the elbow. This sensation is stated to continue during the intervals, and to accompany these varieties of neuralgia more frequently than others; pain is most easily excited by touch and pressure applied to those parts at which the nerve is nearest to the surface, and not covered by layers of muscle, as at the inner side of the elbow, or at the ulnar or radial surfaces of the fingers. The movements are impeded and painful, even out of the paroxysm, but the rapidity of motor conduction, as compared with a healthy extremity, is unaltered.

I have not been able to discover any fixed type in these varieties of neuralgia. At times the attacks of pain follow one another so rapidly, that an appearance of continuity is produced. Intervals of greater or less duration then occur, which are generally ascribed, both by physicians and the patient's friends, to other circumstances than those inherent in the nature of the morbid affection.

This neuralgia is less frequently isolated than sciatica or tic douloureux; it combines with other affections of an allied or different nature, with cervical and intercostal neuralgia, and, according to Cotugno's observation, with sciatica of the same side, and with cardiac neuralgia (angina pectoris); the latter I have myself seen alternating with neuralgia of the ulnar nerve.

The female sex seems more liable to it than the male: hysteria is a strongly predisposing circumstance. Diseases of the heart, and especially affections of the valves, not unfrequently induce pain of the ulnar, and at times of the radial nerve, especially of the left side. In hepatic disease similar phenomena occur in the right arm, the pain taking the course of the cutaneous branch, sent to the shoulder from the axillary nerve. A rheumatic constitution may frequently be distinctly demonstrated to exist.

In regard to treatment, we cannot hope for the same results that purgatives afford in neuralgia of the lumbo-sacral plexuses. In five cases of ulnar neuralgia, Cotugno[1] obtained the most marked benefit from the application of blisters, and by maintaining their discharge. Valleix is more in favour of flying blisters. I have met with a palliative effect from inunction with veratrine ointment, and have obtained a radical cure of pure neuralgic affections, by the use of the warm baths of Wiesbaden and Aix-la-Chapelle, and especially by employing these waters in the shape of douches.

CERVICAL AND INTERCOSTAL NEURALGIA.

Valleix has deserved well of the study of these affections, for which he deserves the more credit, because he has thus assisted in more correctly interpreting many a fact, which in modern times has been classed with the protean forms of spinal irritation.

The lower cervical nerves bear to neuralgia of the arm a similar relation to that existing between the upper (especially the second and third, from which the occipital nerves branch off,) and neuralgia of the posterior surface of the head. The pain extends from the upper cervical vertebræ to the vertex, the external ear, and the mastoid process; occasionally it remains limited to a few small spots, but may be complicated with painful sensations in the face, or of the lower jaw, if the upper cutaneous nerves of the neck are affected. The pain occurs by jerks and starts, as in other neuralgic affections, both while the head is at rest and during its movements, which the patients avoid during the attack.

The sensation is so superficial that even the hairs participate, and, as I have occasionally observed, the patients fear contact; they complain, even in the intervals, of a dull sense of numbness, and do not well bear strong pressure with the finger, applied to parts covered with muscular layers.

---

[1] De Ischiade nervosa commentarius; Viennæ, 1770, p. 119.

It is necessary to be on the guard against confounding occipital neuralgia with periostitis and diseases of the vertebræ. We here meet with tearing pains, occurring especially at night and in paroxysms, at the back of the head and neck, and shooting upwards to the vertex, as well as downwards to the shoulders and upper arm; but the movements of the head continue impeded during the intermissions, and it can only be rotated at an expense of considerable pain. We may add a symptom, which has already been noticed by Rust, as pathognomonic, that as soon as the patient attempts to exchange the recumbent for the upright posture, he has a difficulty in raising his head without assistance, and that to do this,[1] he supports the occiput with his hand.

In the distribution of the dorsal nerves we meet with neuralgic diseases both on the anterior and posterior surface of the trunk, as well as on both coincidently. The intercostals are most frequently affected, the disease being more commonly seated in several of the nerves than in a single one, especially in the middle and lower branches of one side, and particularly of the left; the pain either encircles the waist like a girdle, or starts up at certain spots near the vertebræ, the sternum, or the thorax, tearing, dragging, and agonising the patient. It is increased by a gentle touch, but relieved by strong pressure. It is not long since I saw a patient who had for many years suffered the most intense neuralgia of the left side of the thorax, and whose dress was rubbed through at this point by the constant application of the hand. Movements, especially of a respiratory character, such as coughing and sneezing, excite and augment the pain, though respiration itself is not impeded. A dull sense of numbness continues during the intervals.

Similar neuralgic phenomena manifest themselves occasionally in the posterior and anterior branches of the first lumbar nerves.

The most fertile source of this variety of neuralgia is, the female sex, (nearly three fourths of these patients are females,) anæmia and hysteria. It occurs with the most various complications. It is most frequently associated with neuralgia of the gastric branches of the vagus, as manifested by pain in the region of the seventh and eighth dorsal vertebræ, along the lower ribs, chiefly of the left side, and at the pit of the stomach, and rising to the chest and neck in the shape of pyrosis and globus hystericus.

---

[1] See Romberg's klinische Ergebnisse, 1846, p. 3.

We must here devote some attention to a painful affection of the mamma termed mastodynia neuralgica, with which the researches of Sir Astley Cooper have made us acquainted.[1]

One or more points of the mamma become very painful and tender to the touch. The pain resembles tic douloureux, passes through the breast and the neighbouring nerve like an electric shock, running up to the shoulder and arm-pit to the inner side of the elbow, and to the fingers, and sometimes descending to the hip. When it reaches its climax, vomiting frequently supervenes; the patients are unable to lie or sleep upon the affected side; the weight of the breast in bed raises the pain to the most intense degree; heat and cold alternate in the breast; the colour of the skin remains unaltered; and no trace of inflammation is visible.

The painfulness is increased before the period of menstruation, is less during its continuance, and diminishes after it has ceased. In some cases only a small portion of one breast is affected; in others its entire circumference; and not unfrequently both breasts at the same time. This state of things may continue for months, or even for years, with rare intermissions, but without any tendency to a malignant character. Young females between the age of sixteen and thirty are most liable to be attacked. The disease is not observed before the development of puberty, though it is occasionally met with at an advanced age.

A peculiar kind of tumour occurs in the mammary gland, which might be termed neuralgic (irritable tumour of the breast). The tumour has a sharp outline, is very tender to the touch, from time to time most intensely painful, and especially so before the menstrual period; it is very moveable, and varies in size from that of a pea to a marble. Generally there is only one, though there may be several; though it lasts for years, it does not increase, nor does it suppurate; it ceases occasionally to be painful, and disappears without any apparent cause. On examination, these tumours are found to consist of a firm semi-translucent substance, in which fibres are irregularly scattered; nerves cannot be traced into them; they appear rather to be a produce of the cellular tissue of the breast than of the glandular structure, and they occur in the cellular tissue of other parts accompanied by similar symptoms. They are distinguished from other tumours, from hydatids, scirrhus and fungus, by the accompanying pain, the tenderness on the slightest touch or pressure, and the enduring pain following a local examination. Irritability of constitution predisposes, and it is commonly accompanied by derangement of the catamenia and fluor albus. The patients generally attribute it to a blow, a push, or to pressure from some portion of the dress.

---

[1] Illustrations of the Diseases of the Breast; London, 1829, p. 76.

There is a remarkable etiological relation between herpes zoster and intercostal and lumbar neuralgia; whoever has had occasion to observe this disease, must at times have found it difficult, from the pains that preceded or followed, to determine whether he should class this affection with the neuralgiæ or with skin diseases. Thus Rayer[1] quotes a case in which there was only a single patch of vesicles below the scapula, but a very severe pain in the left side, extending like a girdle from the spinal column to the sternum. I venture to suggest the possibility of another etiological influence, to be found in the vicinity of the blood-vessels in the intervertebral foramen, as their extension and morbid changes necessarily affect the adjoining nerve, more or less. The vertebral artery deserves to be especially regarded in this respect, as diseases connected with ossification of the cerebral vessels, such as softening or hæmorrhage, are frequently accompanied by complaints of severe pain in the region of the occipital nerves.[2]

These varieties of neuralgia are very enduring; they continue for years; and the effect of remedies is very doubtful. Remissions may take place under the most opposite treatment. The first thing to be attended to is the improvement of the patient's constitution. In the majority of instances, steel, especially the sesquioxide of iron, the potassio-tartrate of iron, and the natural or artificial chalybeates, are indicated. The value of arsenic has to be determined by future observations. A satisfactory result may be expected from the employment of the warm baths and douches of Wiesbaden and Aix-la-Chapelle; whilst nothing but aggravation and increased obstinacy of the neuralgia is to be looked for in the present fashionable remedy of the cold wet sheet. I have seen two convincing cases of this kind, in which even sea baths failed of their effect. Among the local remedies, flying blisters, veratrine, (we do not possess sufficient evidence in favour of aconitine,) the oleum terebinthinæ ætherum, and wearing a hairskin, are found to afford relief.

---

[1] Traité théorique et pratique des Maladies de la Peau: 2d edit., vol. i, p. 335.

[2] See Bright,—cases illustrative of the effects produced when the Arteries of the Brain are diseased. Guy's Hospital Reports, vol. i, p. 9.

Mastodynia, whether complicated with a tumour or not, requires to be locally as well as generally treated. The topical application most praised by Sir A. Cooper, is a plaister consisting of equal parts of ceratum saponis and extractum belladonnæ, or a poultice of bread crumbs with a solution of belladonna. The breast may be advantageously covered with oiled silk, a hareskin, or some other fur. Leeches are only advisable if the pains are very intense; if employed too often they increase the debility and irritation. For internal exhibition, calomel is recommended in combination with opium and conium, with an occasional laxative, followed by a pill like the following:

℞. Extr. Conii;
Extr. Papav., āā gr. ij;
Extr. Stramonii (e seminibus), gr. ¼—ss.
M. Fiat pilula; pilula talis bis vel ter die sumenda.

To restore the menstrual functions we must give carbonate of iron, ammonia, citrate of iron, mist. ferri comp., alone or in conjunction with aloes. Hip-baths of sea water, or of ordinary water with salt, are advisable. Operative measures are not required, though timid patients often insist upon removal of the tumour, from fear of carcinoma.

CHAPTER VIII.

PRURITUS—FORMICATIO.

Hyperæsthesia of the cutaneous nerves is not characterised by pain, but by other manifestations of sensation, the physiological condition of which has not as yet been determined. The more frequent of these are itching and creeping. The frequent occurrence of itching in cutaneous diseases, when it is a mere accidental symptom, has induced nosologists to include it altogether in this class of affections; and they have classed it with the papulous disorders, under the name of *prurigo*. An eruption of small vesicles of nearly the same colour as the skin, and when scratched becoming covered with a little black scab, is said to be present in many instances, and to be absent in others: for this latter reason a *prurigo sine papulis* has been adopted. Nor is it confined to vesicles; pustules, furuncles, and abscesses may follow, the pruritus all the while continuing unaltered. We cannot, however, doubt that causes and consequences have here been confounded: whoever will take the trouble to observe a simple pruritus of the sole of the foot may convince himself of this. During the painful restlessness which preceeds, and at the time of the occurrence of the itching, no change whatever could be observed in the skin. If the itching increases the surface becomes red, its temperature rises, and little nodules make their appearance. These disappear on the decline of the attack; but continue and become torn and bloody if the patient cannot keep from scratching. Nevertheless, the pruritus ceases to return after a definite or indefinite period. The nodules can scarcely be considered as an idiopathic exanthema, but they arise in consequence of the hyperæsthesia, in the same way as disturbances of the secretion and the like occur in other hyperæsthesiæ. The itching rarely affects the entire body; it is generally confined to limited parts, and generally gives a preference to those covered with hair.

The second and third branch of the fifth pair, with their nasal, and occasionally their lingual filaments, the articular branch of the vagus, the lumbar and the sacral plexuses, are most frequently the seat of this hyperæsthesia. The pudendal and hæmorrhoidal nerves are especially liable to be the seat of annoying irritation in either sex; described by Willan and others under the different names of *prurigo pudendi muliebris*, *prurigo scroti*, and *prurigo podicis*. Of the cutaneous nerves of the extremities the plantar branches of the tibial nerve are most frequently affected, owing to which the interstices between the toes and the sole of the foot become the seat of the most agonising itching. Nor are the superficial nerves alone affected; for pruritus also occurs in the mucous membranes of the urethra, the vagina, and the rectum.

It may present a periodic character, and even occur regularly at the time of the catamenia, and with hæmorrhoidal discharges, or it is persistent, with nocturnal exacerbations.

Early and advanced age affords a predisposition to the affection. Suppressed sanguineous fluxes, especially from the uterus, or from hæmorrhoids, frequently induce it. Hepatic disease bears a distinct relation to pruritus: this is a well-known fact in regard to icterus; but I have repeatedly seen violent plantar pruritus without jaundice, but evidently dependent upon hepatic disturbance. Joseph Frank[1] has met with pruritus of the mamma under similar circumstances. Intestinal irritation, especially induced by lumbrici, excite annoying pruritus of the nose. Stone in bladder gives rise to itching of the glans penis. Certain substances taken into the stomach are known to produce it occasionally, as spirituous beverages, muscles, and especially opium. Dr. Bally[2] states that pruritus is a sure sign of poisoning by morphia. Nor should the influence of the mind be overlooked. The sight or remembrance of an itching object frequently excites pruritus even at the identical spot.

Allied to pruritus is the sensation of *pricking*, as experienced in what is called the going to sleep of the extremities, and *formication*, or the sense of ants creeping over the skin.

---

[1] Medic. univ. præc., vol. viii, sect. ii, p. 377.

[2] Lembert, Essai sur la Méthode endermique, p. 31.

Hippocrates[1] speaks of the sense of formication along the spine as a symptom of tabes dorsalis; and although it is by no means constant or pathognomonic of the disease, it is of physiological interest, because it can only be interpreted, like the pain in the cutaneous nerves occurring in diseases of the central organs, according to the law of eccentricity. Formication occurs as the consequence of poisoning in the disease called ergotism, which arises from the consumption of spoilt rye. The external and internal exhibition of veratrine also induces an annoying sensation of pricking at various points of the body, more particularly in the toes and points of the fingers. Generally, however, formication accompanies anæsthesia.

The *treatment* of pruritus is very unsatisfactory; we must regret this the more as this variety of hyperæsthesia, by maintaining great restlessness, reacts injuriously upon the mind. A cure is more easily affected in children than in old people, in whom the affection generally resists all remedies. In plethoric individuals, and after the suppression of sanguineous discharges, the abstraction of blood by cupping is indicated; in the former the employment of the mineral acids, the muriatic and nitric, are advantageous. In senile prurigo diuretics have been recommended on the supposition of an imperfect secretion by the kidneys, the result they afford does not, however, answer expectation. Baths may be advisable, and sea baths, or such to which bolus alba[2] has been added, may be employed. Even palliatives have been sought for in vain. Frank[3] has recommended Plenk's ointment for prurigo of the scrotum and pudenda, viz.:

℞. Ungt. Hydr. Nitr., ℥j;
  Adipis, ℥ss;
  Hydr. Precip. Rubr., ℈j.
S. Mane et nocte parti affectæ infricandum.

No experiments have as yet been made with veratrine ointment.

---

[1] See Convulsio cerealis, in the part treating of the neuroses of motility.

[2] [Bolus alba is described in the Prussian Pharmacopœia as a mineral to be found in various places, of a friable, whitish character, easily melting in water, and consisting chiefly of clay.—Ed.]

[3] Loc. cit., p. 384.

ARDOR AND ALGOR.

The perception of physical warmth is also conducted by the cutaneous nerves of sensation; this power does not, according to Bell's observation, appertain to the sensory nerves of the muscles, for when these are exposed in surgical operations they exhibit sensitiveness on the application of hot or cold water, but are stated to be incapable of appreciating a change of temperature. It follows that ardor and algor occur as cutaneous hyperæsthesiæ; they are manifested by a sense of heat and cold, which does not correspond with the indications of the thermometer.

A common form is ardor volaticus s. fugax; it is characterised by a hot flush passing over the forehead and chest, especially the face, and occasionally accompanied by the appearance of a thin perspiration. After a few minutes this phenomena disappears as rapidly as it appeared. I have generally met with it in females about the climacteric period, and after the cessation of the catamenia; it is associated with mental excitement and great restlessness, and though it often obstinately resists all the remedies tried, it may, after a few years, yield of its own accord. The superficial character of the symptoms easily induce the practitioner to abstract blood, but this is rarely of use. I have seen the most benefit result from the use of the mineral acids, in such a form as the following:

℞. Elixir. Acidi Halleri, vel Elixir. Vitrioli Mynsichti, ʒj;
Elixir. Aurant. Comp., ʒij.
Dose, 30 drops three times a-day.[1]

The chilliness accompanying the numbness of the limbs forms a contrast with the hyperæsthesiæ just spoken of: we shall advert more fully to it in the chapter treating of anæsthesia, as well as of the sensation of cold confined to a small spot, algor circumscriptus. The individuals are almost always females with an hysterical diathesis. The symptom generally occurs on the scalp, and occasionally on the skin of the abdomen; it appears in paroxysms and again vanishes, together with the other hysterical symptoms. We shall speak of the aura as the forerunner of epileptic attacks, when we examine into the nature of this disease.

---

[1] [Elixir acidum Halleri, the Mixtura sulphurico-acida of the Prussian Pharmacopœia, is made by dropping slowly one ounce of rectified sulphuric-acid into three of rectified spirit. The Elixir vitrioli Mynsichti, or tinctura aromatico-acida of the same pharmacopœia, is prepared by dropping half an ounce of rectified sulphuric acid into a pound of aromatic tincture.—Ed.]

Bell[1] possesses the merit of having directed attention to this point; his observations are as ingenious as they are conclusive.

In this manner, we not only become conscious of changes taking place in our muscles, but also perceive definite relations of the external world to our body. The different impression produced, for instance, by the resistance of the ground we tread on to the muscles of the sole of the foot, gives rise to the sensation of firmness or vibration. The blind man can distinguish, as well as the person endowed with sight, whether he is ascending or descending a hill, or whether he is moving his arm in an horizontal or vertical direction. We determine the weight of objects placed in our hands solely by the sensation conveyed through the sensitive muscular nerve.[2] The sensation of muscular action is of the greatest consequence with regard to the function of sight. The perception of the movement of visual objects depends as well upon the progress of the image upon the retina as upon the sensation of the muscles of the eye, being reduced to consciousness; the fatigue of these muscles operates injuriously upon the power of vision, and appears to be the cause of the painful affection, to which hitherto the term *hebetudo visus* has been applied. The affected eye at first sees equally well with the healthy eye, in close proximity and at a distance, and is equally able to distinguish clearly the most minute objects; but the power of endurance in the exercise of this function soon ceases; almost with every moment the patient loses this facility of accurately discriminating. Objects placed at a small distance apparently become confused, and a rapidly increasing, and at last insupportable sense of weight, tension, and fatigue, in the orbital and frontal region, force the patient entirely to desist from continued exercise of his eyes; if he perseveres, headache and giddiness supervene. In some cases, slight capillary injection of the conjunctiva, and accumulation of tears, has been observed; the eye blinks with greater rapidity without affording relief, and at last the eye must be entirely closed, or for a time directed to more distant objects; all the annoying symptoms then disappear, to recur as soon as the eye is again occupied with very near objects. This condition is graphically described by Böhm,[1] and we refer to his excellent monograph for the further details. He does not, as is generally done, admit that the malady depends upon an absence of visual power, but he believes it to be owing to the weariness of the nerves and muscles, which are too weak to accommodate themselves to short distances, and exhibit their fatigue by the above-named symptoms. The best results are experienced by the employment of convex glasses.

---

[1] The Nervous System, &c., 3d ed., 1836, p. 196.

[2] See the excellent investigations of E. H. Weber, de pulsu, resorptione, auditu et tactu; Lipsiæ, 1834, pp. 81—113.

The same law applies to the sensitive muscular nerve, which rules other sensory nerves; that external causes are unable to produce any kind of sensations, which we are not also capable of experiencing independently of those external exciting causes by the consciousness of the condition of our nerves. In the present instance, it is manifested in a sense of *illusory movement*, or *illusory position*, which we consider as the characteristic trait of the disease, termed giddiness or

VERTIGO.

The sensation of illusory movement generally attacks the individual suddenly and without premonitory symptoms; consciousness is unaffected, and it is referred by him, either to himself or to surrounding objects. He feels as if he were going to fall, or were turning round, or as if everything else were doing so. This sensation is invariably preceded, accompanied, or followed by another symptom, the sense of disturbed balance. With these main features other phenomena are associated, though they are less constant, as optical or acoustic hyperæsthesia, (coruscations, tinnitus aurium,) painful sensations in the head, especially in the occiput, nausea, vomiting, trembling, with cold perspiration, muscular tremors, a full, slow, or small and frequent pulse, flushing and pallor of the face, and cold feet.

The direction in which the movement appears to take place varies. Both the Greek and Latin terms for the affection indicate a circular movement; δῖνος denotes an eddy, a circular dance; and vertigo appears to be copied from it. Wepfer,[1] to whom we are indebted for some excellent observations on the subject, distinguishes three varieties:—vertigo *titubans*, vertigo *vacillans* sive fluctuans, and vertigo *girosa;* in the first the body appears to move backwards and forwards; in the second the movement seems to be to one side; and in the last rotatory. Boerhaave[2] establishes a distinction between *vertigo* the circular and *nutatio* the vertical illusory movement.

---

[1] Das Schielen und der Sehnenschmitt, in seinen Wirkungen auf Stellung und Sehkraft der Augen., 1845, pp. 109—146.

The different directions in which the movements seem to occur, is a horizontal or vertical circle, the circumference of which is before or behind the patient, sometimes pass into one another, or alternate in the same individual. Wepfer[3] describes a case of this kind in the following terms: "Aliquando omnes tres species vertiginis in uno paroxysmo adsunt, quandoque sola vacillans seu ex uno latere in alterum nutans, et putat caput instar navis ad latera a fluctibus percussæ nutare ac vacillare; quando titubans est, putat sibi supine non prone nec in latere, cadendum esse; imo fere supine prosterneretur nisi sustentaretur."

The illusory movement may, when it affects the body of the individual, seem to engage the whole or separate portions, as, for instance, the head. A girl of eight years of age was under my care, to whom during attacks of vertigo the surrounding objects appeared to mount from below upwards, and who at the same time had a sensation as if the head, and especially the forehead, became too high.[4] Wepfer in the passage already quoted says, "Paroxysmos precedit tinnitus aurium et videtur sursum capillis caput trahi;" and in another passage, "caput semper antrorsum vergere videtur."[5] Canstatt relates the case of a patient affected with nocturnal vertigo, who, during the period of his attacks, was waked up regularly at 3 o'clock in the morning by giddiness; he screamed for help, begging to be raised, as he thought he was standing upon his head; he never suffered from horizontal vertigo; if he turned round quickly enough upon his right side the giddiness vanished, and equally if he jumped rapidly out of bed.[1]

---

[1] Observationes medico-practicæ de affectibus Capitis internis et externis; Scaphus, 1727, pp. 217—314.

[2] Prælect. acad. de morb. nervor. cur. v. Eems; Lipsiæ, 1762, p. 476.

[3] Loc. cit., p. 285.

[4] Romberg zur Lehre von dem Schwindel, in—Wochenshrift für die ges. Heilk., 1833, p. 1057.

[5] Loc. cit., p. 249.

The position of the head at the commencement of the vertigo exerts an influence upon the direction and seat of the illusory movement. Wepfer[2] says, "Quando sedet, putat inferiorem truncum antrorsum et retrorsum moveri; quando decumbit, moveri videtur caput solum hoc modo, quando sinistro lateri incumbit, minor adest hæc fluctuatio."

It is necessary to define more accurately the relation existing between the sensation of illusory movement to muscular action, to the senses, and to consciousness. When the consciousness is unfettered there is no real movement which corresponds to the apparent movement; but the sensation of a disturbed balance is at times so considerable that it overpowers the will struggling against the impression, and the patient falls (*vertigo caduca*). Among the nerves of sense, the optic nerve is most frequently drawn within the range of the affection. Double or chromatic vision, or coruscations, almost invariably accompany the attacks of vertigo, and the rotatory movement of visible objects may attain such a degree of velocity that everything appears enveloped in mist and darkness, (*σκοτόδινος*, *vertigo tenebricosa*.)

Those patients who *complain* of the illusory movement and the disturbed balance, prove by doing so, that their consciousness is unaffected; accordingly the will continues to be active. They try to secure themselves against the abnormal sensation, which threatens to carry the body away with it, by means of movements which require some force for their execution, as by stretching out their arms, by planting the feet firmly, or by pressing the trunk against a support. If the freedom of consciousness is interrupted a different train of symptoms occurs, as in the vertigo of dreams occurring in sleep, (vertigo nocturna.) The direction of the apparent movement in these cases is rarely rotatory, it is generally from above downwards, dreams of tumbling down a staircase being most common; or it may be upwards, or backwards and forwards, variations which probably depend upon the position of the head. People also dream of sinking into the earth, of an illimitable chasm opening before them, or of houses threatening to overwhelm them, and the like. Vertiginous diseases occur most frequently in those who suffer from giddiness in the waking state. Wepfer[1] remarks, "Unice de vertigine sollicitus est, quæ ipsam quoque decumbentem in tecto et in somno invadit; hac vespere indormire ante primam non potuit, et quando indormiebat, insomniis etiam vexabatur, ac si vertiginem pateretur et cum ancilla recidisset, unde perterrita mox expergefiebat." If consciousness be impaired during the waking state, and the will have lost its power, no resistance is offered to the impulse to move in a certain direction, and the apparent movement is converted into a real one. Drunkenness affords daily evidence of this.

---

[1] Klinische Rückblicke und Abhandlungen, 1848, p. 81.

[2] Loc. cit., p. 294.

The giddiness occurs in paroxysms ordinarily of short duration; they may continue from a few minutes to a quarter of an hour, but rarely more. The attacks recur with more or less frequency, being sometimes repeated several times in the day, or even in the hour. We rarely find a uniform type. The disease is frequently chronic, and may continue for a series of years. The chief predisposition exists in middle life and advanced age, childhood is generally exempt. I have only observed a few cases of its recurrence in the latter; one occurred in a boy of three years labouring under meningitis from which he recovered, and who, on the first day of the disease, and during sleep, often screamed out, in great terror, "I am falling." Giddiness is induced with more difficulty in children by rapid rotatory movements than in adults, they therefore bear it better. A plethoric constitution and sedentary mode of life, especially in the climacteric period of women, favour the origin of this affection; we also find that debility brought about by exhausting discharges, especially spermatorrhœa, and the convalescence from other maladies, predispose to it. The continued employment of spirituous liquors is also apt to induce it.

Among the causes of vertigo, the state of the blood occupies an important position, and we find that both an increase and a diminution in the supply of blood are followed by vertigo. Thus it commonly accompanies diseases of the heart, and especially hypertrophy of the left ventricle. On the one hand we find vertigo induced by suppressed hæmorrhoids, menstruation, epistaxis, or the omission of habitual abstraction of blood; on the other, hæmorrhages, whether undeveloped or intermittent, arthritis, or trichoma,[1] pregnancy, and the pressure of tumours in the abdomen, are to be classed in this category; not unfrequently the affection is caused by injury and diseases of the brain, and especially of the cerebellum, or by epilepsy, for the paroxysms of which vertigo is not unfrequently substituted. Diseases of the præcordial organs, such as the spleen, &c., are often accompanied by giddiness; and future investigations will have to determine whether definite forms of vertigo depend upon the affections of different organs. The more frequent exciting causes are, intoxication by alcoholic liquors, and by narcotics, as from nicotiana, especially from smoking, from belladonna, digitalis, hyoscyamus, or carbonic acid gas. We must also mention gorging of the stomach with indigestible articles of food, with carbonated beverages, the stage of incubation of other diseases, especially of a febrile and contagious character; also unusual movements or positions of the head, as continued stooping or sea voyages, interrupted or suppressed respiration, straining in defecation or parturition; affections of the mind, vivid impressions of the senses, especially of the retina, with residuary images, atmospheric influences, the spring and autumn seasons, and sudden diminution of atmospheric pressure.

---

[1] Loc. cit., pp. 227 and 286.

The artificial production of giddiness in healthy individuals has long been an acknowledged fact, but we owe it to Purkinje[2] that this matter was first introduced into the range of experimental physiology. This distinguished philosopher describes some of the more ordinary conditions of vertigo in the following words:

"The illusory movements affecting the sense of touch, and having a reference to the weight of the body and limbs of the individual, causes both the former and the latter to appear suspended according as the conditions of the sensations are varied. If to each hand a weight relatively of considerable magnitude be attached, and we carefully watch the sensation produced by gravitation, it will appear as if every moment an addition were made to the weight, until at last it becomes impossible any longer to support the enormous burthen. If after holding the weights for a certain time in the erect position they be put down, it appears as if one were induced to mount straight upwards, and as if the hands which were let down to hold the weights were considerably shortened, and must, as it were, creep into the thorax. If anything was held in the closed hand, it appears afterwards as if the hand were constrained to double itself up into a fist."

---

[1] See J. P. Frank, Opuscula Posthuma, 1824, p. 237.

[2] Beiträge zur näheren Kenntniss des Schwindels aus heautognostischen Daten. In, Medicinischen Jahrbüchern des KK. oestr. Staates., 1820, vol. vi, p. 78 seqq.; and, Ueber die physiologische Bedeutung des Schwindels und die Beziehung desselben zu den neusten Versuchen über die Hirnfunctionen; in, Rust's Magazin für die gesammte Heilkunde, 1827, vol. xxiii, pp. 284—310.

If we institute similar experiments with the muscles of the eye, still more striking results are afforded, and we find, on account of the altered relations to the activity of the sense, that the impression of apparent movements of visible objects is produced.

For instance, if we look fixedly at an object quite to one side of the body, it appears to vanish in that direction, and the eye will be required constantly to exert itself anew to retain it.

Vertiginous sensations are most easily and powerfully induced during and after oscillatory and especially by rotatory movements of the body of an active or passive character; the direction of the apparent movement is determined as established by Purkinje's[1] observations, by the position occupied by the head during and after the rotations of the body. "If the face," says the author just quoted, "be turned to the ceiling, and the eye be fixed upon a given point, round which, as the pole of a vertical axis, the body is turned a certain number of times, the visible objects of the ceiling, as well as the floor of the room, will, if the position of the head and the direction of the eyes be maintained, appear to move in an horizontal direction. If during the proceeding the head be brought back into the ordinary upright position, the direction of the horizontal movement of the vertigo will be converted into that of a vertical wheel; this sensation will also be communicated to the tactile sense of the hands and feet, the floor appearing to sink down on one side and to rise on the other. If, in addition to the axiliary rotations of the body, the head be inclined as strongly as possible to either shoulder, and the individual experimented upon be arrested after making a number of rotations sufficient to produce the sensation of vertigo, and the head be then brought back into the vertical position while the body is firmly supported, the field of vision and the objects in it will appear to the eye and the touch to be tumbling over from before backwards or the reverse, according to whether the rotations have been effected while the head was turned to the right or the left." It follows from all these experiments, that the section of the head as of a globe, round the axis of which the true movement took place, always determines the apparent movement of the objects during the subsequent position of the head when the rotation is arrested; the same applies to attacks of vertigo, as we have before stated.

---

[1] Purkinje, in Rust's Magazine, &c., p. 290 seqq.

The vertiginous sensations are to be distinguished from others that occur when the eyes are closed, and in blind people; these Professor John Müller has accounted for by referring them to the after effects of visual impressions upon the retina. If, for instance, the eye has been fixed for any length of time upon the undulations of running water, and be then suddenly turned to terra firma, the ground appears to move in a direction contrary to that of the water. Assuming that a series of after impressions remained in the eye which successively disappear, the passage of these secondary impressions while the eye is bent on the ground will necessarily produce the appearance of the ground moving in an opposite direction.[1] The visual giddiness will be excited the easier, even by trifling and transitory impressions, the more irritable the retina.

We have yet to discuss the manner in which the brain participates in vertigo; as the organ of the soul, it reduces the vertiginous sensations to consciousness, and converts them into conceptions of space. We will not even venture a supposition as to whether the excitement occurs by definite channels, as we might assume it to do, from the influence exerted by the position of the head, and the modifications of the real movements produced by injuries of certain parts of the brain, inflicted for the purposes of experiment;[2] we prefer adhering faithfully to our determination of avoiding the region of impossibilities.

We will not detain the reader by futile investigations into the proximate cause of this hyperæsthesia. We are warned by the history of the theories of vertigo. Sauvages' theory of a retrograde movement of the blood in the retina, and the views of Marcus Herz, who attributed vertigo to a psychical influence, have alike, and justly, been consigned to oblivion, because they failed to satisfy the simplest demands which can be made to the theory of a disease, viz., of careful and satisfactory observation of its phenomena. Visual vertigo was selected as the type of the disease, and little recked the theorists that sleeping, blind, and narcotised individuals also suffered from the affection.

---

[1] Müller's Physiology, Dr. Baly's edition, vol. ii, p. 1179.

[2] See the Chapter on Neuroses of Motility.

Nosology.—The older nosologists assumed a false relation between this variety of hyperæsthesia and consciousness, inasmuch as they placed vertigo among the hallucinations. Modern writers have erred equally, in dividing the subject into visual and tactile vertigo, and vertigo of space and of time. The physiological element of classification must be taken from the seat of disease in a definite organic apparatus, and the activity it displays. In this way, vertigo is explained as hyperæsthesia of sensitive muscular nerves, which rarely proceed from the peripheral, but generally from the central nervous apparatus.

Prognosis.—We should not allow ourselves to be misled by Boerhaave's[1] dictum: "Vertigo est omnium morborum capitis levissimus et facillime curabilis, unde omnes alii capitis morbi incipiunt et qui, hisce curatis, sæpe relinquitur." Every central neurosis is in itself important, and only ceases to be so when the cause has been removed. The vertigo that is caused by profuse discharges and exhaustion, is curable, whilst it is beyond the reach of the healing art when it accompanies cerebral disorganisation. Vertigo, resulting from hæmorrhage, is more easily curable than that which is brought on by the suppression of habitual sanguineous discharges. It not unfrequently ceases on the eruption of other diseases as epistaxis, otorrhœa, hæmorrhoids, arthritis, and trichoma. The middle period of life is favorable to it. In vertigo caduca and tenebricosa, the prognosis is said, by older authors, to be more unfavorable than in simple vertigo.

The *treatment* of vertigo depends upon the cause, constant regard being had to the constitution of the individual. In idiopathic vertigo it will be necessary to see whether mere erethism is at the bottom of the complaint, or whether already material alterations have taken place. In the first instance, acids (the elixir acidum Halleri, elixir acidum Mynsichti, acidum phosphoricum,)[1] and nux vomica, in powder, from one to three grains twice a day, are to be recommended. In the second case, we must have recourse to the local abstraction of blood, especially cupping at the occiput and nape of the neck, issues and cold effusion, which, if they do not cure, may relieve. In consensual vertigo, we must chiefly attend to the state of the digestive organs, and well distinguish between mere repletion of the stomach with undigested matters and atony. In the former case, evacuants, and even emetics may freely be employed, in the latter, the bitters, such as menyanthes trifoliata, or quassia, in combination with rhubarb. Diseases of the spleen and the liver deserve especial attention. In metastatic vertigo issues are most beneficial. If plethora or suppressed sanguineous discharges give rise to the complaint, venesection and local abstraction of blood must be employed. Vertigo, arising from profuse discharges and exhaustion, must be treated with tonics, of which the dose is to be gradually increased.

---

[1] Prælect. acad. de morbis nerv., p. 475.

We may add the following rules, as generally applicable to the treatment of patients subject to vertigo: they should avoid violent, continuous, or rotatory exercise, abstain from highly nutritious and heating articles of diet, and suppers: they should not indulge in much sleep, or the use of feather-beds, or of (warm) baths. Counter-irritation to the skin by sinapisms, footbaths with mustard or ley, the use of the fleshbrush, with cold washing of the trunk, and the exhibition of cooling laxatives, are to be recommended; such as the following:

℞. Flor. Sulph.,
Cremor Tart., āā, ℥ss;
Res. Guaiac., ʒj.
Fiat pulvis. Cochleare minus mane et nocte sumend.

℞. Magn. Sulph., ʒvj;
Magn. Carb., ℥ij.
Fiat pulvis. Cochleare minus ter die sumend.

---

[1] [Vide suprà, p. 89, note.—Ed.]

Small doses of bitter water[1] may be taken in doses of a wine-glassful before going to bed, and the first thing in the morning.

As a palliative, the patient should be recommended, before the supervention of an attack, to direct his full attention to movement. The patients do this, in a measure, of their own accord, by supporting themselves firmly, with their hands and feet, in order to resist the illusory movement. The sense of vision may be employed for the same purpose; thus the vertigo, produced by rotatory movement of the body, may be suppressed, by looking steadily at the finger held up to the eye, or by turning round in a direction opposite to the previous movement.

---

[1] [The waters of Saidschütz and Püllna are commonly known in Germany as bitter waters; their chief properties depend upon the sulphates of soda and magnesia, which they hold in solution; the latter also contains a minute quantity of iron, and is considered more digestible than the former. Two ounces taken in the morning, generally suffice to produce a free evacuation.—Ed.]

CHAPTER X.

HYPERÆSTHESIA OF THE VAGUS.

The title of this Chapter itself is intended to suggest that this powerful nerve of sensation does not show an exaltation of its sensibility by *one* mode of expression, as pain, but by a variety of peculiar sensations, according to the specific manifestations belonging to the different subdivisions. The experiments made upon living animals afford some clue to this matter,[1] but the pathological conditions in man, though complicated, afford more distinct and trustworthy information, as we are assisted by the communications made by the patient. We will first examine that variety of hyperæsthesia of the vagus which manifests itself by pain; viz.

NEURALGIA OF THE RESPIRATORY AND GASTRIC BRANCHES OF THE VAGUS.

Neuralgic symptoms occur more frequently in the latter than in the former. In the respiratory branches they occasionally assume the character of pruritus; the tickling sensation felt at the bifurcation and inducing cough, is not only met with as an accompaniment of bronchitis,[2] but may occur with any complication. I have seen rare instances in which the patients complained of a sense of cold passing up the trachea, though the air expired was warm; the subjects were affected with hysteria. The pruritus occasionally shows itself in the auricular branch of the vagus, and its character is proved by the cough and even vomiting accompanying it.

In the gastric distribution of the vagus, the neuralgia is ordinarily met with in three forms; as a sense of constriction of the pharynx, of burning in the œsophagus, and of tenderness of the stomach. The former is known as globus hystericus, the second is included under the head of pyrosis, and the last I term gastrodynia neuralgica. The globus hystericus is generally looked upon as a motor affection, or spasm of the pharynx; but liquids and solids pass equally well through the gullet: one is not justified, even if there is a sense of constriction, in assuming a spasm of the pharynx. My view is corroborated by the fact that the ball appears to *rise* in the throat—the symptom occurs most frequently in hysteria, hence its appellation; it is occasionally a precursor of epilepsy. This variety of neuralgia is rarely manifested as a mere sense of pain in the pharynx. Hedland[1] relates the case of an amaurotic female labouring under a tumour of the pituitary body and disorganisation of other parts of the brain, who suffered such intense pain in the pharynx, which was otherwise perfectly sound, that she felt assured there must be a tumour in the part.

---

[1] We refer the reader especially to the excellent researches by Arnold, in his Bemerkungen über den Bau des Hirns und Rückenmarks, nebst Beiträgen zur Physiologie des zehnten und eilften Hirnnerven; Zürich, 1838, p. 106 seqq.

[2] Stokes, on Diseases of the Chest, p. 54.

In *pyrosis*, a sensation of heat and soreness passes from the stomach up to the gullet, which may or may not be accompanied by a flow of gastric juice or saliva. Gout, hypochondriasis, and pregnancy, predispose to the affection. Abstinence from greasy articles of food and from spirituous beverages, and the continued exhibition of bitters, as quassia combined with rhubarb, generally effect a cure.

GASTRODYNIA NEURALGICA.

Attacks of painful sensations in the stomach, varying in kind and intensity, pressing, tearing, stretching, alternate with intervals of rest and freedom from pain. The pain is not generally increased by pressure from without or within (repletion with food), but rather diminishes on its application. There is almost always continued appetite, amounting at times to voraciousness. Sympathetic sensations, globus hystericus, pain in the back, and dysuria, are rarely absent, while reflex action of the abdominal muscles, tympanitic distension, vomiting, eructation, and yawning, are ordinary accompaniments. Nutrition remains unimpaired even when the disease is of long standing.

A predisposition to the affection exists in the early and middle periods of life; it is also favoured by hereditary constitution, hypochondriasis, hysteria, and gout. It cannot be denied that an especial relation exists between this neuralgia of the vagus and the uterus. Chlorosis and fluor albus are frequently associated with it, and in many females the return of menstruation is announced by gastrodynia. This is the reason of the great prevalence of the malady in the female sex. We also find that it is often due to profuse discharges, especially of semen, and to masturbation.

---

[1] Ammon's Zeitschrift für Ophthalmologie, vol. v, p. 367.

The disease has a chronic character: the prognosis is on the whole favorable, though treatment is often ineffective, and the affection may only disappear with advancing age. There is little difficulty in distinguishing it from disorganisation of the stomach, such as chronic inflammation, ulceration, or scirrhus, when these are fully developed; but at their commencement it causes much difficulty—for which reason mistakes are not unusual. The following may be enumerated as safe means of establishing a diagnosis: 1. The effect produced by pressure. In neuralgic gastrodynia the most superficial touch instantly produces pain; whilst firm compression produces no inconvenience or even relief; the reverse is the case where there are structural lesions. 2. The function of digestion; this is disturbed, and the secretions altered and painful in disorganisation, painless in neuralgia. 3. The sympathetic affections; these are characteristic of hyperæsthesia, while they are absent in organic disease. When the latter has endured for a longer period, it is marked by the absence of the ordinary complexion and by considerable emaciation.

In treating this affection we must pay particular attention to the causes to which it may be attributed. After they have been removed and the complications disposed of, the following remedies may be looked upon as particularly serviceable. In the first place, sea-bathing should be repeatedly tried; next in order, stands steel in the shape of chalybeates, the waters of Spa or Pyrmont, natural or artificial, which may even be taken during the winter months, in doses of from one to two wine-glassfuls, or of the various preparations of the pharmacopœia; among these, Abercrombie prefers the sulphate of iron, in doses of from one to two grains made up with extract of aloes. We can also recommend the exhibition of bismuth:—

℞. Bismuth. Trisnit., gr. j—ij;
Hyoscy. Extr., gr. j;
Magn. Carb.,
Sacch. alb., āā, gr. v. Fiat pulvis, bis vel ter die sumend.;

the nitrate of silver at a quarter of a grain pro dosi, nux vomica at from 8 to 10 drops of the tincture, or 1 to 3 grains of the powder, belladonna, the root or the extract, the latter dissolved in aqua laurocerasi—

℞. Extr. Belladonn., gr. iv;
Aquæ Laurocer., ℥ij. M. bis vel ter die gutt. xvj, sumend.;

and valerian, especially in the form of infusion with the menyanthes trifoliata. As a palliative chamomile proves serviceable either as an infusion or its ethereal oil—

℞. Ol. Chamom. Ether., f℈ss;
Sp. Eth. Sulph., ʒij. M. alterna quaque hora gutt. xv, sumend.;

and carminatives, and in very obstinate cases, opium. The treatment may be aided by external applications, such as the emplastrum belladonnæ, the emplastrum galbani, friction with the following liniment—

℞. Mixt. Oleo-balsamic.,[1] ℥j;
Tinct. Opii, ʒij. M. fiat liniment.;

with a few drops of oleum sinapis, and by enemata of assafœtida. The diet should be carefully regulated. Wet feet, and constipation, to which the patients are very liable, are to be avoided. Saline purgatives should, however, be avoided, as they are apt to excite the neuralgic attack. Cold beverages and ice are injurious, as well as fat, cured meat, and watery fruit.

BULIMIA, POLYDIPSIA.

The varieties of hyperæsthesia of the vagus just treated of do not differ from those of the cutaneous nerves; the specific manifestations of the nerve, however, differ essentially both in their hygienic and their morbid phenomena from the tactile sensations of the skin. We now allude to the sensations connected with the functions of nutrition and respiration.

The sense of *hunger* and *satiety* is propagated along the fibres of the gastric distribution of the vagus, and more particularly by fibres having their peripheral termination in the stomach. The experiment of dividing the vagus in animals contributes to elucidate this point; and although scepticism may reject one result, the loss of appetite after the operation, it cannot do so with regard to the other, which proves the loss of the sense of satiety. Animals subjected to the operation have been observed by Le Gallois, Brachet, and Arnold, to continue eating until their stomach and pharynx were distended to an enormous size, and the food actually gushed from the mouth from over repletion. Similar voraciousness has been met with in man, and has been mistaken for hunger, whereas it is a proof of anæsthesia. In hyperæsthesia the sense of satiety does not cease, though it may present itself in an abnormal relation to the appetite. Thus both sensations may be exalted; it not unfrequently happens that where there is a voracious appetite, a sense of repletion follows upon the consumption of a trifling quantity of food. In other cases satiety follows later. Voracious appetite—bulimia, cynorexia—is generally associated with other sensatious; such as one of burning or gnawing at the pit of the stomach, of overpowering debility, resembling syncope. The psychical relations of the sense of hunger are altered; there is no appetite, and taking food affords no enjoyment. At times vomiting and diarrhœa supervene.

---

[1] [Mistura oleoso-balsamica sive balsamus vitæ Hofmanni is an aromatic tincture made from lavender, cloves, cinnamon, rue, orange, mace, marjoram, lemon-peel, and balsam of Peru.—ED.]

This species of hyperæsthesia rarely occurs in an isolated or idiopathic form; it is generally associated with other morbid states, and is then only a sympathetic phenomenon; thus we meet with it during the period of convalescence, in pregnancy, in agues, hysteria, and insanity, in ergotism, helminthiasis, diabetes, and it also presents itself, like other hyperæsthetic conditions, as the precursor of various maladies, as for instance, of gout. Prognosis and treatment must vary accordingly. In obstinate cases we may expect some benefit from keeping up a prolonged state of nausea.

Besides hunger, we find the sensation of thirst connected with the function of nutrition, and though the vagus cannot with certainty be proved to be the conductor of this sensation, it may be affirmed to be so with some probability; Valentin[1] ascribes the function to the sensitive branches distributed to the pharynx. Larrey[1] states, that he has observed injuries of the œsophagus and the vagus nerve to be accompanied by very violent thirst; a peculiar disease of the stomach, gastromalacia, is characterised by the most intense thirst. Hyperæsthesia of the sensation of thirst, *polydipsia,* has been occasionally observed as a primary affection; the patient longs especially for cold beverages, and is tortured day and night by the desire for drink. He does not generally suffer from hunger; at times there is even a distaste for food. The renal secretion corresponds in amount to the quantity of beverage consumed, and excepting the necessary dilution, it does not differ from the normal constitution of urine. The tongue and pharynx are generally dry and red, and the saliva is sparingly secreted.[2] Early life, from the third year to puberty, is most predisposed to the affection. The causes that give rise to it are obscure. Jos. Frank mentions a boy of twelve years of age, who was a patient in the Willna hospital, and suffered from unquenchable thirst; he drank as much as twenty quarts of liquid in four and twenty hours, and complained, at the same time, of a pain at the epigastrium, which had supervened suddenly with the thirst, when he was one day attempting to extricate his cart that had stuck in the mud. The prognosis of this hyperæsthesia is not favorable. J. Frank[3] lauds the sal prunellæ (nitrate of potash) as a specific, in the following form:

---

[1] De functionibus nervorum cerebralium et nervi sympathici libri quatuor; Bernæ, 1839, p. 78, § 100.

℞. Salis Prunell., ʒj;
Aquæ Font., Oj;
Syr. Rubi idæi, ℥j. S. Alternis horis ℥j—ʒij, sumendæ.

This salt must be used with care, for in one case death has resulted from a large dose of a table-spoonful. Brodie[4] relates a case of intermittent polydipsia occurring in daily paroxysms, which yielded to quinine.

Polydipsia is more frequently associated with other diseases, as diabetes mellitus, and diuresis connected with an abnormal relation of the urea, with the cold stage of ague, and the loss of serous fluid, as occurs in the most palpable manner in Asiatic cholera. Baglivi[1] has drawn attention to the fact, that the employment of blisters is accompanied by intense thirst.

---

[1] Clinique Chirurgicale, vol. ii, p. 155.

[2] An interesting case is given by Dr. Martini in Rust's Magaz., 1827, p. 149.

[3] Jos. Frank; Prax. Medic. Univ. Præcepta, vol. i, p. 299—313; Lips., 1835.

[4] Lectures illustrative of certain Nervous Affections, p. 30.

As the sensations upon which the function of nutrition depends are conducted by the gastric distribution of the vagus nerve, the wants of the economy, as regards the aeration of the blood, are conveyed to our consciousness by the distribution of the same nerve to the organs of respiration. This specific action of the branches of the vagus is excited not only by external irritation in the lungs, but also by subjective impressions, and by circumstances by which the irritability of the nerve itself is exalted. I shall have occasion to dilate upon an hyperæsthesia of this kind, occurring during sleep, and known as *nightmare*, or *incubus*, when we come to the consideration of *hypnoneuroses*.

---

[1] Dissertatio de usu et abusu vesicantium, cap. ii, § 1.

CHAPTER XI.

HYPERÆSTHESIÆ OF THE NERVES OF THE ORGANS OF SENSE.

HYPERÆSTHESIÆ SENSUALES.

THE great progress made by modern physiology, in representing the sensible qualities of material objects as expressions of the activity of the senses, which may be manifested independently of external irritation, in consequence of an altered condition of the nerves, has borne much fruit in the field of pathology. Hitherto hyperæsthesiæ of the nerves of sense had been classed with hallucinations; they will now occupy their proper place in nosology, and take their position among the hyperæsthesiæ of other nerves. Nor is it less important, either with regard to nosology or etiology, to have ascertained that the same influence excites in each nerve of sense only that special impression of which it is capable; in the optic nerve it produces the sensation of light; in the acoustic, that of sound; and so on with the others. It is also of consequence to remember the fact demonstrated by Henle, in his valuable *Pathologische Untersuchungen*,[1] that the irritation does not induce the sensual phenomenon, but merely strengthens or modifies it, and that the nerve of sense retains its activity, which periodically rises and falls, without any other impulse than that which the vital reaction of the economy exerts.

The older pathologists took a limited view of the relation of the hyperæsthesiæ of the senses to consciousness; it is of sufficient consequence to demand a distinct notice here. The part which the sensorium takes in the action of the nerves of sense in the normal condition, and which renders it so difficult to determine what belongs to the mere impression upon the senses, and what to the imagination, acquires an overpowering influence in the hyperæsthesiæ. To this must be added the influence exerted by attention, which not only fixes the phenomenon, but is able to heighten the force of the impression.

---

[1] Page 214.

It is extremely difficult to ascertain precisely whether the affection has its seat in the central or peripheral parts of the nervous system; except in that case in which the peripheral distribution has become incapable of conduction, and the sensual impressions can only be excited at the cerebral terminations of the nerves. Our knowledge on this point is most advanced in regard to the optic nerve.

HYPERÆSTHESIA OF THE OPTIC NERVE.

The characteristic of optical hyperæsthesia consists in the production of luminous and chromatic sensations, dependent upon increased sensibility of the optic nerve.

This condition excludes every sensual impression upon the organ of sight, which is excited by external influences, whether by a normal stimulus of the optic nerve, as light, or by some other agent, such as pressure, a blow, galvanism, and the like. The sensation of light in these cases stands in a definite relation to the duration and intensity of the objective stimulus, and even the after operations of the visual impressions, the secondary images, diminish from the first instant, and do not return, when they have once disappeared, whilst the luminous phenomena of hyperæsthesia keep pace with the increase of irritability, both as to duration and intensity. The forms under which these phenomena occur are various, like those determined by luminous rays. They may present sharp and defined limits and boundaries, or they may be confused and indistinct.

Both older and recent nosologists have attempted to apply a nomenclature to them. Sauvages[1] speaks of suffusio scintillans, radians, suffusio Danaes. Modern authors distinguish between photopsia, luminous phantasmata, and chromopsia, or coloured phenomena. It is important, in reference to a diagnosis between central and peripheral disease, to ascertain the shape, and especially the sharpness of the contour. If the retina be the part affected, the images present a sharp outline, which may be so marked that as the retina in this condition is sensible of itself, the patient may perceive parts of it, or its blood-vessels, or even the movement of the blood corpuscles.[1] The patients themselves see the phenomenon with such precision that they attempt to give a delineation of it. Ruete, who has laboured successfully to establish the physiological relations of ophthalmic disease, has described such luminous phenomena as originating in the circumference of the optic nerve, and invariably commencing externally to the optic axis, in the direction corresponding to the optic nerve. They generally have a semilunar form; they are less frequently circular, with an asteroid border and a silvery, golden, or coloured margin. The rays are in a constant state of intense cilia-like movements, appearing most frequently in the right eye, less frequently in the left, and least of all, on both eyes at once; they follow the movements of the eye, and as the organ adapts itself to nearer or more remote objects, they increase in apparent size and intensity. If the distance of the object remains the same, they retain the same size only for a short time; they then begin to extend and to move to one side, and almost backwards; at last the fire seems to dart from the forehead, the temple and the zygoma, if the cause of irritation resides in the vicinity of the ciliary portion of the retina, as the lines of vision of this part pass through the localities alluded to. As the lines of vision approach the ciliary portion, the phenomenon ceases, because the nervous fibres terminate here. Its duration varies from several minutes to several hours, and it may return after weeks, months, and even years. The phenomenon remains luminous, whether the eye is open or closed, except that it is rather more vivid and distinct in the latter case. Vision is not impaired; even during the persistence of the phantasmata, objects that are not covered by the rays appear distinct and well-marked; but those that interfere with them become indistinct, and look as if surrounded by a halo. Violent headache generally ensues, accompanied by a sense of tension and weight in the eye.[1] If the central organ of the optic nerve is the seat of the affection, the luminous pictures are less defined; they resemble the images of dreams, are removed from the circle of human or animal forms, and, from the field of vision presenting no depth, appear disposed upon a flat surface.

---

[1] Nosol. Meth. ed. Daniel, vol. iv, p. 268.

---

[1] Purkinje; Beiträge zur Kenntniss des Lebens in subjectiver Hinsicht.—Müller's Physiology, Dr. Baly's translation, vol. ii, p. 1162.—Valentin; de Function Nerv. Cereb. et Nervi Sympathici, p. 15, § 31, art. 6.

It is important to attend to the relations existing between optical hyperæsthesia and the visual impressions made by objective stimuli and consciousness. The phantasms are perceived while the eyes are open and while they are closed, as well as in the case when the rays of light are precluded from acting upon the retina; of this the following case is an instance:

Mrs. G—, a widow of eighty-five years of age, and of a robust constitution, was affected, eight years previous to her death, with cataract of both eyes; she underwent an operation, which appeared at first to prove successful; after a few months, however, her sight became impaired, the left bulb became atrophied, the right pupil closed, and the patient was now only able to distinguish light from darkness. At this time she first began to complain of seeing long rows of worms, long strips of coloured linen, or long threads of worsted, constantly passing upwards. An artificial pupil was now made in the right eye. The phantasms ceased for a time, but returned after eight weeks, first assuming the old shapes, and subsequently new ones. High walls rose up before her, heavily laden carts surrounded her, or human figures hovered about her, generally threatening and alarming, rarely with a friendly aspect. These phenomena generally occurred only during the waking state; they soon became so vivid, that the patient felt convinced of their real existence, and though continuing in the full possession of her intellectual faculties, made defensive movements with her hands whilst conversing. Her forehead was hot, the face much flushed, the pulse fat and hard, and there was a sense of anxiety and oppression, which, with the other symptoms, became aggravated towards night. The phantasms continued, with occasional remissions and exacerbations, during six years, until death ensued. Fits of vertigo and unconsciousness supervened, associated with weakness, and subsequently with paralysis of the left arm; these recurred several times during the year, without exerting any influence upon the visual phenomena. In the month of January, 1837, the patient was seized with a more violent apoplectic attack, the symptoms of which were deep coma, continuing for four and twenty hours, stertorous breathing, slow full pulse, paralysis of the left arm and leg, and involuntary discharge of urine and fæces. She recovered also from this attack, and lived for a year and three months later without further inconvenience. On the 16th of March, 1838, after feeling particularly well and happy during the previous day, she was seized, during the night, with a fresh apoplectic attack, accompanied by complete apoplexy of the right side; she died in the evening of the following day. In the right hemisphere of the cerebrum, not far from the external edge of the posterior lobe and the surface, we discovered a cavity of the size of a plum, invested with a reddish membrane, and containing a small quantity of ochry fluid: I still retain the preparation. There was fresh extravasation of blood in the middle and posterior lobe of the left hemisphere, near the corpus striatum and the thalamus opticus. The latter was converted into a greyish red pulp. The optic nerves and the chiasma were normal. An examination of the retina was not permitted.

---

[1] Ruete; Lehrbuch der Ophthalmologie, 1845, p. 71.

Even when disorganisation and atrophy of the peripheral termination of the optic nerve has occurred, hyperæsthesia may present itself with great intensity as a centric affection. A case of this kind has been described by Dr. Johnson.[1] It occurred in a distinguished artist, who had for several years suffered from photopsia, to which afterwards headache and diminution of vision were added, terminating in complete blindness. Nevertheless the luminous phenomena continued night and day, and occasionally assumed the appearance of angels with flaming swords, whose movements were apparently accompanied by an electric light. The forms, however, frequently varied. The mental powers of the individual remained unimpaired, and whenever he went out he was very attentive to everything that did not require eyesight. In the spring of 1835, he had an apoplectic seizure, which deprived him of movement, consciousness, and speech. Urine and fæces were voided unconsciously, and the pupils were enlarged. He recovered from this condition, and after a few weeks he was again able to go about the town and attend to his business. But the visual phenomena returned, and were painfully dazzling, and almost more continuous than before. In the month of August, the apoplectic attack returned, and death ensued in three days. The right lateral ventricle of the brain contained nearly three ounces of clear fluid. The left was full of bladders resembling hydatids, of various sizes, and containing fluids varying in consistency. This botryoidal accumulation sprung from the floor of the ventricle by a kind of pedicle, and penetrated into all the recesses of the cavity, pushing its branches forwards, so as to extend beyond the thalamus of this side into the opposite half of the brain, destroying everything that opposed its passage. Both thalami optici were converted into a pulp as well as the whole anterior lobe, which was so diffluent as scarcely to bear the slightest pressure. The optic nerves were compressed by the hydatids, so as to present a mere thready appearance. Optical hyperæsthesia bears a close relation to the mind. The affection of no other nerve of sense produces so powerful a conviction of the reality of its phantasms: there is none that so easily causes an alienation of individuality during the phenomena, and by this means insanity.

---

[1] Medico-Chirurgical Review, 1836, No. 37.

The *causes* influence either the peripheral or the central distribution of the optic nerve. Among the former are overstimulation of the retina by intense light, (Purkinje's blendungsbilder, dazzling images,) or by long-continued microscopic investigations.[1] Thus Henle[2] relates, that while examining for several days continuously in summer, the ciliary movements of branchiobdella, the tremulous striæ reappeared in the evening among the confused threads passing before the quiescent eye, luminous and well-defined, and with the same wavy movement shown by the microscope. Among the causes we have also to mention congestion of the *retina,* with which it appears that a definite form of the phantasms, and the influence of respiration, are connected. We find it mentioned by Sauvages, in the work already quoted, that in reticular suffusion, the retina becomes dark during inspiration, and is cleared up during respiration; Müller[1] observed that if he closed his eyes, and for a length of time watched the darkness, a light frequently became diffused from a certain point rhythmically over the field of vision, which was synchronous with respiration and after a time disappeared. The luminous spectra attain the highest degree in inflammation of the retina. The causes may act directly or indirectly upon the central structure of the optic nerve. Thus optical hyperæsthesia is a frequent accompaniment of cerebral disease, as insanity, (according to Esquirol,[2] in eighty cases out of a hundred,) delirium tremens, vertigo, hypochondriasis, and ecstasis. So called magnetic and religious visions have attained a melancholy notoriety by the deceptions and lies with which physiological facts have been enveloped. Affections of the mind, and especially fear and terror, narcotics, particularly opium and digitalis, and other substances that enter the blood, operate in a like manner. Thus, in his experiments with laughing gas, which is a powerful agent in causing ocular spectra, Unzer saw a variety of luminous forms, fiery points, animals, and the like; and Sir Humphrey Davy[3] narrates his personal experience with the protoxide of nitrogen, in the following words: "During the time that I frequently inhaled the gas, I slept much less than usually, and before going to sleep my imagination was long occupied with numerous visionary images. In proportion as the agreeable sensation increased, all connection between my conceptions and external objects ceased. Trains of vivid spectra passed rapidly before my mind's eye."

---

[1] Valentin, loc. cit.

[2] Ueber das Gedächtniss in den Sinnen, Wochenschr. für die ges. Heilkunde, 1838, p. 203.

Optical phantasms are caused by congestion or the withdrawal of blood from the brain; thus syncope invariably commences with optic hyperæsthesia. We must not forget the influence of obstructed sanguineous discharges, as an instance of which, we remind the reader of the effect of an omitted venesection in the well-known case of Mr. Nicolai.[4] Debi-

[1] Ueber die Phantastischen Gesichtserscheinungen; Coblenz, 1826, p. 15.

[2] Des Maladies Mentales, vol. i, p. 199.

[3] Reil's Fieberlehre, vol. iv, p. 285.

[4] [The Mr. Nicolai referred to is the person to whom Goethe alludes in Faust, where Mephistopheles, addressing the Proktophantasmist, says:

"Er wird sich gleich in eine Pfütze setzen
Das ist die Art wie er sich soulagirt,
Und wenn Blutegeln sich an seinem Steiss ergetzen
Ist er von Geistern und von Geist curirt."—Ed.]

litating discharges, especially seminal emissions, morbid conditions of other organs, particularly of the heart and of the digestive organs, are frequent causes. Nor may we omit atmospheric influences, an interesting instance of which is given by Professor Zeune,[1] who states, that in two of his blind pupils ocular spectra are indicative of atmospheric changes. In fine weather they enjoy pleasing visions, while they see confused images in dull weather.

Optical hyperæsthesia generally runs a chronic course; it threatens danger both to the eye and the brain; not unfrequently coloured and luminous vision precedes amaurotic blindness. The influence exerted upon the mind by the affection is manifested even in peripheral hyperæsthesia of the optic nerve. With the exception of hæmoptysis there is, probably, no disease which, from its first commencement, makes so deep an impression, depriving the patient of resolution and self-command, and frequently laying the foundation to enduring hypochondriasis. In central hyperæsthesia the reaction is less rapid, but, as I have already had occasion to state, it is more overwhelming.

In our treatment we must, therefore, have regard to the regulation of the mind. We must attempt to divert the attention of the patient, though the most persevering efforts to do so frequently fail of success;—the various means at our command will be examined in the chapter on hypochondriasis. The effect of alterative and nauseating remedies in inveterate cases has met with more laudation than is warranted by experience. They are occasionally effective in recent attacks; thus their exhibition was followed by good results in the case of a young man of four and twenty, whose health had previously been excellent, but who had suffered much from the influence of an unhappy attachment. Six weeks before consulting me he accompanied a friend to his apartments, and, accidentally in the dark, took up something that was lying on the table, and which he recognised, when the object was suddenly illuminated, as a human skull. From this moment he suffered from spectra in the right eye; a shapeless, luminous object appeared to approach him on one side, and gradually assumed the form of a disc, brilliant with all the colours, which was turned round with extreme velocity before the right eye. This phantasm caused the patient such extreme anxiety, that when his attacks came on he was violently agitated; it occurred chiefly at night, and he would then take refuge with his mother or sister, and cling to them, and at last throw himself despairingly and in tears upon his bed. By attacking the nerves of the stomach antagonistically by emetics, and following them up by purgation, a cure was effected in ten days. In other cases the employment of suitable warm mineral baths and travelling may prove beneficial. I have met with several individuals who, perhaps, were not entirely relieved from their spectra by these remedies, but who were enabled to raise themselves above their influence on the mind. It is almost superfluous to suggest the necessity of attending to the part played by the blood in hyperæsthesia whether the disease occupy a peripheral or a central seat. Constipation must be counteracted and all local irritants avoided.

---

[1] Belisar., p. 25.

ACOUSTIC HYPERÆSTHESIA.

Acoustic hyperæsthesia is characterised by a sensation of sound and musical notes dependent upon increased irritability of the acoustic nerve.

It is easy to ascertain the cause of a sound arising externally to the organ of hearing by concussion of the atmospheric waves; but it is difficult, and often impossible, to determine whether the acoustic sensation is owing to increased irritability of the nerve or to a sound produced in the interior of the ear. The remissions and variety of the sounds have been stated to serve as a criterion, but the rushing sound produced by condensation of the air in the tympanum, and tension of the membrana tympani, comes and goes, and may alternate with noises of a different character. We can only assume the seat of the affection to be in the nervous structures with certainty, when deafness coexists.

The sounds perceived differ very much, from simple tinnitus aurium to melodious chants; or they may resemble the human voice or the cries of animals. It is useless to designate these varieties by separate names, and the nomenclature hitherto adopted, (susurrus, sibilus, tinnitus, bombus, &c.,) has no other value than that it indicates the difference between a mere noise and a definite tone.

The sensations of sound occur whether the ears be closed or open, in quiet retirement or noisy society; they are not unfrequently so intense that the impression of the atmospheric waves upon the acoustic nerve is weakened, and even obliterated; this is particularly the case in tinnitus aurium, which most patients look upon as the sole cause of their deafness.

In a review of my remarks on this subject in the first edition of the present work, Kramer has shown the difficulty of diagnosing the tinnitus aurium depending upon acoustic hyperæsthesia, as it accompanies most affections of the ear, whether of the meatus, the tympanum, or the Eustachian tube; any attempt to determine whether the peripheral or central portion of the nerve were affected would, therefore, be vain and rash. We are, consequently, merely able to form a conjecture as to whether affection of both acoustic nerves, cophosis (deafness), vertigo, a complication with optical spectra, and marked sympathy of the cerebrum, indicate central hyperæsthesia.

The causes of the malady affect either the peripheral distribution of the nerve or the brain. Violent explosions and continued loud noises must be reckoned among the former. This variety of hyperæsthesia is frequently the forerunner and associate of diseases of the brain; it precedes apoplectic and epileptic fits, generally follows upon vertigo, and frequently accompanies insanity. Esquirol[1] mentions two mad women, who, though completely deaf, constantly heard voices of human beings with whom they quarrelled until they wound themselves up to the most violent rage. The vascular system exerts an undoubted influence upon this hyperæsthetic condition. It is a common thing to hear patients affected with hypertrophy of the left ventricle complain of rushing and roaring, not only in the ears, but, as they express themselves, in the entire head. Tinnitus aurium is rarely absent in menorrhagia and other hæmorrhages, and syncope is ushered in by this symptom; hæmorrhoids, too, and the associated derangements of digestion, are often accompanied by acoustic phantasms. I have frequently met with tinnitus aurium as a consequence of the employment of sulphate of quinine.

---

[1] Des Maladies Mentales, vol. i, p. 196.

As regards the *prognosis* of the affection, its relation to hardness of hearing and deafness is of most importance. Itard[1] states that deafness which results from tinnitus aurium is characterised, at least at its commencement, by not preventing the perception of isolated sounds, but that it is merely an impediment to the intelligence of speech, and of a multitude of consonant sounds, as in general conversation, or in singing with a musical accompaniment. He also recommends an experiment which, if successful, is said to remove all doubt; this consists in compressing both carotids for a few minutes. The tinnitus then generally ceases; if the deafness disappears at the same time, it must be looked upon as a consequence of the former, or as the result of the same causes. The effect of the experiment is, however, denied by Kramer.[2]

Before proceeding to the treatment of these illusory noises, it is absolutely necessary that an examination of the accessible portions of the auditory apparatus should be made by an experienced hand. The assumption of a congestive state, against which general and local abstraction of blood is employed, frequently meets with a reductio ad absurdum in the discovery—even by the patent's nonmedical friends—of an accumulation of ear-wax.

We are most likely to obtain a cure when the affection originates in hæmorrhages or exhaustion; we shall succeed less if it rests upon an hypochondriac foundation. Among the local remedies we may expect some benefit, though only of a palliative character, from the introduction into the Eustachian tube of the vapour of ether. In obstinate cases, when the illusory noises disturb or prevent sleep, Itard[3] recommends that the apparent sounds be counteracted by producing a similar uniform real noise. Thus the annoyance of the dull humming in the ear, that resembles the distant roar of the wind or the rustling of a stream, may be relieved by the crackling of a brisk fire. In one patient, residence in a water-mill produced a most satisfactory result.

---

[1] Die Krankheiten des Ohrs und des Gehörs.; Weimar, 1822, p. 181.

[2] Loc. cit., p. 537.

[3] Loc. cit., p. 189.

In that instance, the olfactory nerves were found destroyed, but nevertheless the patient had complained of disagreeable smells.

The observations that have been hitherto published, do not show whether the sense of taste is as much implicated in olfactory hyperæsthesia as it generally is in the sense of smell. A patient, who consulted me some time since, complained of a constant smell of smoke like creosote, which interfered with all his meals. It may be surmised that nausea occurs sympathetically, and vomiting as the result of reflex action in this affection, but we have no definite observations to that effect.

GUSTATORY HYPERÆSTHESIA.

We know least of the affection dependent upon increased irritability of the nerves of taste. Doubts naturally suggest themselves as to the presence of external irritants in the mouth and the mucus of the tongue; while, on the other hand, we know of no instances of gustatory anæsthesia, in which the conducting power of the nerve being destroyed, gustatory perceptions of centric origin occurred. Still the analogy of other sensual illusions scarcely allows certain perceptions of taste occurring in hysteria, hypochondriasis, or insanity, to be differently interpreted.

The tactile nerve of the tongue is more frequently affected by hyperæsthesia than the nerve of taste, and this is manifested by neuralgia, and in the shape of pruritus and ardor.

dwells upon the overpowering sense of prostration, as if the root of life were threatened; this is the symptom which is more or less manifested in every case of hyperæsthesia of the sympathetic, either by itself or associated with pain; the pain itself differs neither in degree nor in character (whether tearing, stabbing, or aching), from that arising in a cerebro-spinal cutaneous nerve; nothing but ignorance could induce a doubt of this fact.

There are a few other peculiarities appertaining to hyperæsthesia of the sympathetic, which depend upon its physiological destination. In the first place, we allude to the excitement of reflex action in the muscles both of the voluntary and involuntary class. In health, the impressions made upon the sensitive fibres of the sympathetic are rarely reduced to consciousness, but at once give rise to reflex actions; in hyperæsthesia, however, a conduction in both directions takes place, and thus not only a perception of the sensation results, but we also find that the muscular fibres contract, whether in the heart, the intestinal canal, the ducts of the glands, or the abdominal muscles. Besides the reflex action, we also find the activity of the nerves presiding over nutrition more excited in this affection than in hyperæsthesia of the cerebro-spinal system. The so-called vegetative functions (secretion, and, in part even, the circulation,) are deranged.

After premising these general remarks, we shall now proceed to examine the hyperæsthetic states of the individual plexuses of the sympathetic.

HYPERÆSTHESIA OF THE CARDIAC PLEXUS.

(*Angina Pectoris.*)

The patient attacked with angina pectoris is suddenly seized with a pain under the sternum in the neighbourhood of the heart, accompanied by a sense of anxiety so intense as to induce a belief in the approach of death. The beat of the heart and the pulse are weak, small, irregular, and intermittent; respiration is generally laboured and oppressed, though at times unaffected, the temperature of the hands and face is cool, the complexion pale, and the features sunken. Sympathetic pains supervene, varying in seat and intensity; the pain most commonly is felt down the left arm, not so often in the right, and very rarely in both at once: it passes down to the insertion of the deltoid muscles, or to the elbow-joint, or along the ulnar nerve to the tips of the fingers; or, again, there may be a pricking sensation, as that felt when the extremities go to sleep. The pain often extends over the neck to the anterior surface of the breast, or by the subcutaneous nerves of the upper cervical nerves, up to the edge of the jaw, and an affection of the vagus presents itself in the shape of globus hystericus. When a paroxysm of this description has lasted from a few minutes to a quarter or half an hour, it generally passes off gradually, with eructations, or it may, though less frequently, cease suddenly, and the health then remains unimpaired, until after a longer or shorter interval the attack is renewed.

This description applies to uncomplicated angina; when it is associated with disease of the heart and large vessels, it presents different characters. We then find that the intervals are not marked by a perfect freedom from disease, and that the paroxysm itself is characterised by the additional symptoms of heart disease. The greater and more rapid the progress of the latter, the more the neuralgic attacks recede, and even disappear.

The seat of the sympathetic sensations is a matter of physiological interest, inasmuch as it indicates the focus of the sensitive fibres of the cardiac plexus. Müller[1] was one of the first to point out that the principal cord of the sympathetic is only apparently continuous from the upper cervical to the coccygean ganglion, and that the fibres derived from the spinal cord, after entering the cord of the sympathetic, continue in it for a certain distance, and then pass off to their peripheral distribution in the intestines. It follows that sympathetic filaments, proceeding from the principal cords, are in close proximity to cerebro-spinal nerves, which have their distribution higher up in the trunk, and that if sensation is radiated from any of the thoracic or abdominal viscera, the pain is felt at the upper extremities, in the neck, or even higher still, in the head.[2] Thus we may, from the sympathetic sensations occurring in cardiac neuralgia, conclude that the sensory fibres of the sympathetic are anatomically contiguous to the sensory elements of the cervical nerves; nor is it surprising that a similar series of symptoms is produced when the cervical portion of the spinal cord is primarily affected. This is a point which has been entirely overlooked by those observers who, treading in the footsteps of Parry and Jenner, taught that cardiac neuralgia, or, as it was first called by Heberden, angina pectoris, was due solely to a peripheral cause; they looked upon a definite organic change, such as ossification to the coronary arteries, as the essential constituent of the disease. Others have been willing to admit that cardiac neuralgia may be attributed to various other morbid affections of the heart, but, as modern research has satisfactorily demonstrated, erroneously; we cannot do better than to refer those who are of a different opinion, to the experience of Laennec[1] for instruction.

---

[1] Handbook of Physiology, Dr. Baly's ed., vol. i, p. 666.

[2] See Henle; Pathologische Untersuchungen, p. 110.

Infancy is entirely exempt from this variety of neuralgia; it rarely occurs in youth, while the middle and advanced periods of life are the most fertile soil for its growth. Arthritis and hysteria are the chief predisposing causes. Violent exercise especially after a full meal, ascending stairs or mountains, affections of the mind, and errors in diet, act as exciting causes.

---

[1] Laennec; Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur, 4 ed., augmentée par Andral; Paris, 1837, vol. iii, p. 495. "La plupart des médecins n'en sont pas moins restés persuadés en Angleterre, en Allemagne, et en Italie surtout, que l'angine de poitrine est toujours liée à quelque maladie organique du cœur, que cet accident est très grave et que la plupart des malades qui en sont attaqués meurent subitement. Ces idées sont loin d'être exactes. L'angine de poitrine à un léger, ou à un médiocre degré, est une affection extrèmement commune, et existe fort souvent chez des sujets, qui n'ont aucune affection organique du cœur ou des gros vaisseaux. J'ai vu beaucoup de personnes, qui en ont éprouvé seulement quelques attaques très fortes, mais de courte durée et qui en ont été ensuite débarassés. Je crois même que l'influence de la constitution médicale contribue à son développement, car je l'ai observé frequemment dans les cours de certaines années et je l'ai à peine rencontré dans les autres. D'un autre coté il est vrai que l'angine de poitrine coincide assez souvent avec des affections organiques du cœur, mais rien ne prouve qu'elle en depende même dans ces cas, puisqu'elle peut exister sans cela et que ces affections sont variables. J'ai ouvert plusieurs sujets attaqués à la fois d'hypertrophie ou de dilatation de cœur et d'angine pectoris, chez aucunes je n'ai trouvé les artères coronaires ossifiées. Un seul d'entr'eux mourût subitement en milieu d'une violente attaque d'angine de poitrine; et l'on concoit que la réunion d'une affection nerveuse aussi intense à une énorme hypertrophie du cœur (qui existait chez ce sujet) puisse quelquefois produire cet effet."

In forming our *prognosis* we must not be led astray by the erroneous assumption, that organic affections of the heart are necessarily associated with cardiac neuralgia. When it occurs in an hysterical subject it loses its importance; while we are justified in feeling some anxiety when it is complicated with gout, especially of an irregular character, as this affection is apt to give rise to incrustations of the valves and the large vessels.

As regards *treatment* we must be very careful in our employment of general bloodletting, especially during the attack. In plethoric individuals, and at the commencement of the disease, cupping and leeches are preferable. If we have to deal with an arthritic constitution, issues, or a seton in the vicinity of the heart, are advisable. In hysteria we must have recourse to chalybeates and sea-bathing. Constipation should be particularly guarded against in these patients, and every kind of exertion should be interdicted; the more so, if there be a suspicion of a complication with organic lesions of the heart. Among the remedies applicable during the paroxysms, I have obtained the greatest benefit from the inhalation of sulphuric or acetic ether, a couple of teaspoonfuls of which may be poured into a saucer, which is to be held to the mouth of the patient until the ether has evaporated. Ether is also adapted for internal administration, with tincture castorei, and, in urgent cases, the addition of opium. Inunctions with the veratrine ointment in the region of the heart, and mustard poultices to the nape of the neck, must be had recourse to. Many patients find relief from raising their arms and keeping them elevated. Laennec[1] met with a case, in which palliative relief was afforded by wearing two thin curved magnetic plates at the scrobiculus cordis, and the corresponding point of the back. Their effect was increased by the application of a small blister under the anterior plate. Frank[2] relates, that he knew a patient who found the most rapid relief from the application of cold lotions to the head. A patient who was under my care, obtained more ease from eating ice during the paroxysm, than from anything else.

---

[1] Loc. cit., p. 497.

[2] Praxeos medic. univ. præcepta, vol. ii, p. 251.

HYPERÆSTHESIA OF THE SOLAR PLEXUS—NEURALGIA CŒLIACA.

A violent contracting pain at the pit of the stomach supervenes suddenly, or after being preceded by a sense of oppression; it generally extends to the back, there is a sense of fainting, the face is fallen in, the hands and feet cold, and the pulse small, cramped, and intermittent. The pain attains such a pitch as to cause the patient to scream out. The region of the stomach is either swelled and distended like a ball, or, as is more frequently the case, it is drawn in, and the abdominal parietes are tense. It is common to find pulsation at the epigastrium. Pressure is not only well borne, but the patient frequently forces the pit of the stomach against some firm object, or compresses it with his hands. Sympathetic sensations occur in many instances in the thorax, under the sternum, or in the pharyngeal branches of the vagus nerve, while they are seldom met with in the superficial parts.

The fit lasts from a few minutes to half an hour; the pain then gradually ceases, leaving extreme exhaustion; or it breaks off suddenly, accompanied by eructations of gas or fluid, by vomiting, by the appearance of gentle perspirations, or copious enuresis. During the intervals, the health is generally uninterrupted.

The periodic type of the paroxysm is occasionally perfectly regular, as in the instance of intermittent fever, complicated with cardialgia, which, in fact, may be quoted as affording the most perfect picture of this species of hyperæsthesia.[1] With this exception, the disease has a chronic character.

Infancy is exempt from it; but there is no exemption as to sex, men being equally liable to the affection as females. The suppression of accustomed hæmorrhages, especially those of the uterus and hæmorrhoids, frequently gives rise to it, while, on the other hand, hæmatemesis and melæna are often preceded by neuralgia cœliaca. Gout offers a predisposition; I have myself suffered from this variety of neuralgia before my first attack of gout, and have a lively recollection of the annihilating sensation, and the pain which resembled the digging of talons into the epigastrium. The development of carcinoma ventriculi is often preceded for years by cœliac neuralgia.

---

[1] Borsieri, instit. med. pract., vol. i, p. 235.

The prognosis is also dependent upon these etiological relations, and the duration of the disease. The more recent the neuralgic affection, the less complicated it is, the more likely we are to be successful; although the tendency to relapses should not be overlooked.

The symptoms are sufficiently characteristic to determine the diagnosis between cœliac neuralgia and inflammation, or disorganisation of the stomach. It is more difficult to distinguish this species from other neuralgiæ occurring in the same range, as is proved by the generic term cardialgia, which is applied to them. I am inclined to think that the peculiar sense of fainting and annihilation accompanying the pain, and which finds an expression in the vascular system, and in the general habit of the patient, is pathognomonic of cœliac neuralgia, and distinguishes it from neuralgia of the vagus.

The treatment does not differ, in any essential point, from that of gastrodynia neuralgia. It is necessary to have regard to the disturbances of the circulation and secretion, in order to obviate structural changes. Blood should be repeatedly abstracted from the part, especially by cupping; derivatives to the surface, by means of issues, may also be employed like the former, during the intervals of neuralgia. Whenever the affection presents periodicity, quinine must be exhibited boldly.

HYPERÆSTHESIA OF THE MESENTERIC PLEXUS.

There is pain, extending from the umbilicus to the abdomen in paroxysms, alternating with intervals of rest. The pain is of a tearing, cutting, or oppressing character, generally winding and pinching, and preceded and accompanied by a peculiar sense of tenderness. The patient is restless, and seeks relief by a change of position, and by compressing his abdomen; his hands, feet, and cheeks are cool; the face is tense; and the knitted eye-brows and contracted lips indicate pain. The pulse is small and hard. The abdominal parietes are tense and distended, or drawn in; nausea, vomiting, ischuria, and dysuria are often present; and at times there is tenesmus. Constipation commonly accompanies the affection; though occasionally the bowels are open or even relaxed.

The fit lasts from a few minutes to several hours, with occasional remissions. It ceases suddenly, as if by magic, and the patient has a sense of extreme comfort. The general course of the disease has a periodical character, though the type is less regular than it is in other varieties of neuralgia.

By applying the generic term colic to every pain in the intestinal tube and the adjoining organs, the advancement of our knowledge of mesenteric neuralgia has been retarded. But one man of celebrity among the older observers, Thomas Willis,[1] has defined its meaning; we quote the following passage from his description of the passio colica: "In order to form a right conception of the seat and character of this disease, we must, above all, distinguish it from the colicky pains which go by the vulgar term,—the gripes. For these arise occasionally from solitary and accidental causes, and attack various people, and especially those of a delicate constitution, and very sensitive and excitable habits. No especial predisposition is necessary; thus incongruous and unusual beverages and articles of diet, drugs, the contraction of cold, and several other influences of a non-natural character, not unfrequently excite considerable derangement of the lower bowels with extreme pain; but this affection must not be looked upon as a disease, but merely as a symptom. But besides this, we have to deal with colic, properly so called, which not so much attacks persons promiscuously from accidental causes, but makes its appearance in some individuals who are predisposed, with peculiar features, and this entirely depends upon a causa procatarctica, which has been gradually developed. The more violent attacks of the disease generally have regular periods, and follow the changes of the weather and the season; when once excited they yield with difficulty to remedies, and do not pass off quickly; but in spite of fomentations and copious evacuations by enemata or purgatives, they persist for several days and even for weeks with great violence. The pains in every paroxysm attack the same part and are generally accompanied by the same symptoms.

---

[1] Opera Omnia, ed. Genev., vol. ii, p. 323, (Latin.)

The colicky pains may not have the same seat in all persons, but sometimes affect the pit of the stomach, sometimes occupy the umbilical region and the hypochondria, at others they may seize upon the hypogastrium and torture the lumbar region; but whenever they return in the same patient, they almost invariably seek their former habitation." The difference in the manifestation of sensation, according to whether the nerve was in its normal or in an abnormal condition of sensibility, has not been attended to, and additional confusion has been produced in the theory of colic, by establishing a classification according to the source of irritation from which the disease took its origin. Nobody objected to bilious, saburral, or flatulent colic, being placed among the neuralgiæ, although few would have consented to class pain, caused by a burn or by a whitlow, as *neuralgia a combustione*, or *a panaritio*.

Anatomical research has not, up to the present time, demonstrated any structural lesions in the ganglia and plexuses of the sympathetic. Dr. Ségond[1] alone, who has observed the endemic cholera of Cayenne, communicates a few post-mortem records, in which the hypertrophy, the alteration in colour, and the induration of the ganglia, and even of the individual nerves coming from the sympathetic, is dwelt upon. We do not wish to impugn the truthfulness of this inquirer; still we are forced to confess, that in order firmly to establish the morbid changes of the sympathetic, the authority of an anatomist who is thoroughly skilled in such researches, is indispensable to prevent misconceptions and to obviate the confusion of normal and abnormal conditions.

The existence of other diseased states affords a soil favorable to the development of mesenteric neuralgia, such as hysteria, arthritis, whether undeveloped or concealed, hæmorrhoidal affections, helminthiasis, and especially tænia. Among the exciting causes we find catarrh, wet feet, cold beverages taken while the body is heated, suppressed perspiration of the feet, diarrhœa, and mental affections, as fright or anger, to be the most fertile sources.

The malady presents a threatening aspect if it passes into ileus. There is a tendency to relapse. The fear that prevails of the supervention of intestinal inflammation is not justified by actual observation.

---

[1] Essai sur la Nevralgie du grand Sympathique; Paris, 1837, pp. 28-9.

Our success in the *treatment* of mesenteric neuralgia depends mainly upon a proper alternation of evacuant remedies and opium. The older physicians paid particular attention to this point, (Fernel, Rivière, and others,) and we owe to the practical genius of Sydenham numerous excellent hints, and much valuable advice. At times the simple laxatives suffice, such as castor oil; but we find the drastic purgatives more effectual, such as croton oil, or syrup of buckthorn, aided by enemata with an emulsion of assafœtida with linseed oil and sulphate of soda. When we have obtained several evacuations we must at once exhibit opium, and not in too minute doses; we must give at least half a grain to the adult, with eight to ten drops of the simple tincture[1] in a clyster. Frictions of the abdomen with warm oil, warm fomentations, and tepid baths, are valuable adjuncts. In advanced degrees, and if ileus supervenes, clysters of an infusion of tobacco may be had recourse to. When repeated attacks of mesenteric neuralgia have occurred in hypochondriac or hæmorrhoidal subjects, it is important to attend to the disturbances which have occurred in the glandular secreting apparatus of the intestinal tube. In such cases the warm mineral baths of Carlsbad, Wiesbaden, or Ems, or the internal administration of the waters of Marienbad, are often most beneficial; their employment renders the subsequent use of sea baths all the more safe.

We shall fail of success unless the treatment be supported by a well-directed regimen. Of the various kinds of exercises, riding on horseback, which was praised by Sydenham as a specific, is to be most recommended.

A species of neuralgia of the mesenteric plexuses, originating in poisoning by lead, or colica saturnina, deserves to be separately considered, as its symptoms are peculiarly modified by the exciting cause. The earlier Viennese school, among whom we may mention De Haen[1] and Stoll,[2] deserve considerable merit for their observation and treatment of the disease. In modern times medical literature has been greatly enriched by the classical work of Tanquerel des Planches.[1]

---

[1] [The Tinctura Crocata, the Vinum Opii of the British Pharmacopœias, and the Tinctura simplex of the Prussian Pharmacopœias, contain six grains of opium to one drachm.—Ed.]

[2] Ratio Medendi, vol. iii, p. 73; vol. x, p. 4.

[3] Ibid., vol. ii, p. 240.

The actual disease is preceded by constipation after previous relaxation, by a sense of oppression at the epigastrium, eructations, and nausea; these precursory symptoms may continue for days and weeks. Pinching, twisting, and oppressive pains then supervene; they generally occupy the umbilical region, but also frequently the epigastrium and the hypogastrium; for the most part permanent, and but rarely shifting their position, they take place in paroxysms differing in duration from a few minutes to several hours; they often rise to the highest pitch especially at night, and then cease, or only remit, so as to leave annoying sensations in the intervals. In most cases the pain is relieved by external pressure applied to the abdominal parietes; this is generally indicated by the position of the patient, who may be found lying on his belly, or bending forward and pressing his hands firmly against his abdomen. The derangement of sensibility is commonly accompanied by disturbance of the motor system; the abdominal walls are generally tense and hard, either throughout or only partially, and this may be a permanent condition, or, though less frequently, occurring or disappearing with the paroxysm of pain. The abdominal parietes are, in rare cases, drawn in, and when this is the case it is chiefly at the umbilicus. If the pain is less intense the walls of the abdomen remain soft; I have seen this to be the case even when the pain is very severe, but they never present tympanitic distension. Tanquerel[2] has been the first to demonstrate contractions in the intestinal canal. Many patients complain of a constriction of the anus when the pain is at the climax, and this, as well as the difficulty which then offers to the exhibition of enemata, sufficiently indicate the existence of spasm. During the paroxysm it is difficult to introduce the finger into the rectum; and when it is done, it is securely grasped by the violent contraction of the sphincter. Above the sphincter the parietes of the rectum are found to approach one another, and to be almost in contact; every fit of pain causes them to contract to such an extent that the exploring finger almost appears incarcerated at the anus. As the pain remits the contraction also yields. A similar effect may occasionally be observed to occur in the contractile tissues of the urinary and sexual organs, when the pain attacks these regions; the symptoms which then present themselves are—urgent desire to micturate, an impossibility to introduce the catheter into the bladder, sudden arrest of the flow of urine, and a drawing up of one or both testicles.

---

[1] Traité des Maladies de Plomb ou Saturnines; Paris, 1839.

[2] Ibid., vol. i, p. 209.

The symptom to be mentioned next in order to the pain is constipation. The intestine is very indolent, and reacts but slowly, even to drastic purges. The evacuations are scanty and laboured, and consist, at first, of dry, globular excrements, like sheep's dung. The sufferers are not unfrequently tormented by repeated empty straining. It is exceptional to meet with diarrhœa in connection with lead colic; but Tanquerel[1] states that during an epidemic of diarrhœa, several patients labouring under colica pictonum were attacked and recovered under the use of the ordinary purgative treatment of this disease. There is generally a troublesome sense of nausea, with which, especially if there be tenderness of the epigastrium, vomiting of biliary, fetid matters is often associated; no chemical examination has, as yet, determined whether these matters contain any lead. The tongue very rarely continues clean; it is gradually thickly coated, and often has a yellow tinge. There is no appetite, and intestinal gases are more frequently discharged upwards than downwards. The urine is light, of a pale yellow colour, the skin dry and of a normal temperature. The most frequent changes are perceived in the pulse; it is generally retarded, firm, and hard, and these characters are the more marked, the more violent the paroxysm; they disappear with its subsidence. Lentin,[2] who may be quoted as a most careful observer, became acquainted with the disease in the mines of the Harz mountains, and remarks distinctly that when the pains of colica pictonum are at their height, which they generally are during the first four days, he invariably found the pulse very slow but full; in proportion as the number of beats in the minute was augmented, the hope of evacuation and relief to the seat; the pain presenting itself alternately in the hypogastric, mesenteric, or renal plexuses.

---

[1] Loc. cit., p. 904.

[2] Beiträge zur ausübenden Arzneiwissenschaft, vol. i, p. 385.

The *duration* of the disease is influenced greatly by external circumstances, and does not, to a great extent, depend upon the intrinsic character of the disease. If the patient withdraws from his injurious occupation and employs suitable remedies, it does not last long, and may endure from a few days to some weeks. Under less favorable circumstances it extends over several months, is less intense, and presents temporary exacerbations.

Lead colic is not often complicated with other maladies. It is rare to meet with it associated with inflammation of the intestines. It is also worth mentioning that phthisis pulmonary rarely occurs in patients afflicted with it.

Among 1217 persons, subject to lead colic, who came under Tanquerel's notice, only 55 were tuberculous, and the experience of Dr. Sander,[1] medical superintendent of mines, accords with that of other experienced physicians, that workmen in silver mines are never seen to suffer from pulmonary consumption; even hereditary predisposition, the greatest fatigue of the respiratory organs, and the constant change of temperature to which they are exposed, and which predispose other miners peculiarly to early and fatal pulmonary diseases, do not induce it in those subject to lead colic. The influence of the prevailing epidemic constitution is undeniable; thus, we have already mentioned that Tanquerel noticed the supervention of diarrhœa. During the cholera it was observed that a much smaller number of lead workmen were attacked with colic than is usually the case; Stoll[2] mentions that he has seen it associated with a bilious summer fever, and Dr. Sander has watched it during the prevalence of epidemic typhus.

The anatomical results of post-mortem investigations of cases of lead colic, which ended fatally from the supervention of other diseases, are extremely meagre. Andral pointedly alludes to the absence of all appreciable changes in the intestine and its glandular apparatus.[3] In one third of the cases that came under his notice, Tanquerel observed that the intestines were crowded together into a small compass, though without any diminution of their calibre, and in one seventh there was marked tumefaction of the glands of Brunner. In a single case there was hypertrophy of the ventral ganglia of the sympathetic, to such an extent that they were double and treble the normal size.[1] Chemistry promises more satisfactory results, as metallic lead has been discovered not only in the excrements, but also in the intestines, the muscles, and even in the brain.[2]

---

[1] See this author's excellent treatise: 'Ueber Chronische Bleivergiftung auf einigen Silberhütten am Harze,' in Casper's Wochenschrift für die gesammte Heilk., 1836, p. 17.

[2] Ratio Medendi, vol. iii, p. 260.

[3] Clinique Médicale, 3d edit., vol. ii, p. 229.

The disease originates most commonly in the introduction into the system of molecules of oxide of lead, which are floating in the atmosphere, or have been volatilised by fire; it is rarely induced by the manipulation of metallic lead; consequently, all trades which necessitate the inspiration or the deglutition of finely-divided lead, or cause it to be deposited on the skin, are peculiarly liable to it,—these are especially the workmen in whitelead manufactories, silver melters, decorators, painters, colourmen, and potters. The development of the affection is favoured in persons living under such circumstances by several predisposing influences, such as early life, the male sex, (as seen in manufactories where females are also employed,) and the heat of summer; Sander mentions foggy and dull weather in the mines, which keeps down the naturally heavy vapours of lead, and prevents their diffusion, and also debauchery and the abuse of brandy. However, we occasionally find individuals who appear to enjoy a remarkable immunity in spite of all these influences, extending through a long series of years, and even through the entire life.

A cause of lead colic, which can scarcely be met with now-a-days, is the poisoning of wine, and especially of cider, either from intentional adulteration, or from these beverages being prepared in presses or vessels lined with lead. This colica pictonum was most accurately demonstrated by George Baker,[3] in 1767; but previously it was attributed to other influences,—to the consumption of fruit, (thus the older writers distinguish colica vegetabilis from colica metallica,) to epidemic[1] or endemic agencies. In the West Indies a colic is indigenous, known by the name of *dry bellyache*, which John Hunter[2] laid to the fault of the lead contained in the rum, although we require most careful investigation to decide the point. Lead colic has frequently been observed to follow the use of provisions prepared or kept in crockery glazed with a salt of lead, and similar diseases are known to occur in animals inhabiting the lead mine districts, in consequence of their drinking the water of springs and rivulets impregnated with particles of lead.[3]

---

[1] Loc. cit., p. 319.

[2] Tanquerel, p. 326.

[3] On the cause of the Endemial Colic of Devonshire, in Transact. of the London College of Physicians, vols. i, ii, iii.

All writers on the subject agree that the disease rarely threatens life. Among the 1217 cases that occurred to Tanquerel, there was but one in which the repeated employment of large doses of sugar of lead for hypertrophy of the heart had given rise to the disease, associated with pains in the joints and paralysis of the upper extremities, and after a duration of three months terminated in death, but where no clue was afforded by the post-mortem.[4] In other fatal cases death resulted from eclampsia or some other disease, which was in no way connected with the lead poisoning; and even these are but rare. Among the 500 patients labouring under colica pictonum, which were treated at the Hôpital de La Charité at Paris, during a period of eight years, five,[5] and of the 1217 mentioned by Tanquerel,[6] only nine, died. Nevertheless, the prognosis, though not alarming as regards life, is rendered unsatisfactory by two circumstances,—the proclivity to paralysis, and the great liability to relapse if the cause of the malady be not avoided.

The results of medical treatment are best determined by instituting a comparison between the time required for spontaneous recovery and the period in which the various modes of treatment achieve a cure. We owe such a comparison to Tanquerel,[7] who has ascertained, by an investigation of this point, that scarcely one half of the lead patients get well spontaneously, and that they are three and four times longer in doing so than those subjected to treatment; while those who remained uncured, or whose convalescence was retarded, rapidly recovered under suitable measures. Similar analyses, which, however, can only be instituted satisfactorily by hospital physicians, would promote the real progress and critical reform of therapeutics. This is one of the great desiderata of medicine, and its achievement would effectually silence the empty boasting of the various disreputable brotherhoods claiming relationship with philosophic inquirers.

---

[1] Huxham; Opusculum de morbo colico Damnoncorum, eoque maxime epidemico, in his—Opera Phys. Med. cura Reichel, vol. iii, p. 54.

[2] Christison, a Treatise on Poisons, 3d edit., p. 497.

[3] Fuchs; Die Schädlichen Einflüsse der Bleibergwerke auf die Gesundheit der Hausthiere insbesondere des Rindviehes; Berlin, 1842.

[4] Loc. cit., p. 472.

[5] Andral; Clinique Médicale, vol. ii, p. 210.

[6] Loc. cit., p. 301.

[7] Loc. cit., pp. 350 and 352.

Among the various methods of treatment of lead colic, whose value we have now to determine, there is one which deserves an especial mention, as it has been extensively employed for a century past; it is that known as the treatment of La Charité of Paris, which has obtained a high reputation, and consists in the alternation of drastic evacuants, whether emetic, purgative, or diaphoretic, with opium. It has been described in detail by Merat[1] and Tanquerel. The average duration of the course is seven days; and while the supervention of other saturnine affections, as paralysis or convulsions, is rarely observed, it is as rarely followed by relapses.[2] Notwithstanding these advantages, the method requires to be altered, as it is extremely complicated, and bears, so to say, a rococo stamp. I am far from instituting a comparison between the number of my own observations and the gigantic scale above alluded to; still, having had extensive opportunities of watching lead colic at an earlier period of my life, I may be allowed to mention a system of treatment which I have followed with success. I commence with the exhibition of croton oil, of which from two to three drops commonly suffice to produce the desired evacuation. They may be prescribed in the following form:—

℞. Ol. Crotonis, gutt. iij;
Sacchari Albi, ʒss.
M. Divide massam in pulveres tres. Sumat æger pulverem unum alterna quaque hora.

This is followed in the evening with half a grain of pure opium. On the ensuing morning the croton oil is repeated. During the day the patient takes an almond oil emulsion, and repeats the opiate at night. As the patients generally applied shortly after the commencement of the attack, I rarely found that more than five or six days were necessary to effect a cure. The narcotising method has been recommended by one of the greatest observers of all times, Stoll,[1] who, after exhibiting a saline purge, trusted to opium, unless there was violent vomiting, in which case he omitted the former and exhibited the opium alone, at the rate of ten grains in four and twenty hours. His words are: "Opium neutiquam morbum palliat, cum perseverantia sanat." Even in the convalescent stage he prescribed from six to eight grains with a bitter mixture, after which the bowels were easily and freely relieved. Stoll himself made the observation that the largest doses of opium given in lead colic produce neither unconsciousness nor pruriginous sweats. Thirty-three years ago I saw my tutor, the late Professor Horn, administer opium and warm baths with excellent results in the clinical wards of the Charité at Berlin. Tanquerel is also willing to admit the efficacy both of opium and the muriate of morphia, although he gives the preference to the exclusive use of croton oil, both on account of the rapidity and permanency of the cure. He gives one drop of it for a dose in a spoonful of barley-water. If neither purging nor vomiting ensue, the dose is to be repeated after seven or eight hours, or an enema of senna to be administered. If the pain has not ceased on the fourth day, a second clyster is to be exhibited, and repeated up to the eighth day. In this case the dose of croton oil may also be renewed. If the patient vomits the remedy, it must be given with castor oil, or exhibited in a double dose as an enema. It is also useful to accompany the medicine with the copious use of barley-water, mixed with a large proportion of honey. The average duration of treatment in 870 patients was from four to five days. In 86 out of 400 patients no amelioration was obtained, and a few were unable to bear it at all. The effect is said to be less apparent in cold, damp weather, than when it is hot and dry."[2]

---

[1] Traité de la Colique Métallique, pp. 156—160.
[2] Tanquerel, loc. cit., pp. 381—392.

---

[1] Ratio Medendi, vol. iii, p. 254.

[2] Loc. cit., pp. 395—402.

CHAPTER XIII.

HYPERÆSTHESIA OF THE HYPOGASTRIC PLEXUS.

This neuralgic affection of the sympathetic has not hitherto been described; it manifests itself by tenderness of the hypogastric region, by a sense of pain and weight in the sacral region, and a feeling of pressure upon the rectum and bladder, and in the female sex upon the uterus and vagina. Sympathetic pains in the thighs and in the range of the hæmorrhoidal nerves are frequent. In females the symptoms much resemble those of prolapsus or retroversion of the uterus, but they occur in paroxysms, and are not relieved by a change of position of the body, and on exploration the uterus is not found to have an abnormal direction. In men these symptoms are commonly known by the term, hæmorrhoidal colic.

Hypogastric neuralgia is unknown in infancy. In the male sex it prevails in the middle period of life. In the female it often shows itself at the development of puberty, and not unfrequently accompanies the menstrual period. It is often associated with an hysterical diathesis. At times it only appears in the period of decrepitude. In both sexes venereal excesses frequently give rise to it. It is evident that the lumbar portion of the spinal cord is implicated, from the painful sensations in the small of the back, from which the neuralgic attack frequently proceeds. As in other neuralgiæ in the range of the sympathetic system, we meet with secondary effects, as manifested by disturbances in the circulation and in the secretions of the affected organs.

Both circumstances must be regarded in the treatment. We may direct our remedies to the lower portion of the spinal cord, and apply cupping, leeches, flying blisters, douches, and cold sponging. If morbid secretions have been set up in the uterine system, the Ems waters are to be recommended in irritable subjects, or the Kissingen waters if we have to deal with torpid constitutions. Antihysteric medicines serve as palliatives. If the neuralgia is concentrated in the rectum, small doses of nux vomica are very serviceable; from one to two grains of the powder of nux vomica, or one third of a grain of the spirituous extract. We must attend to the regulation of the bowels, which may be effected, in hæmorrhoidal subjects, by the aid of the preparations of sulphur. We may also advantageously combine purgatives with narcotics, as in the following formula:

℞. Extracti Conii, ℈j;
  Extracti Hyoscyami, gr. xv;
  Pulveris Rhei, ʒss;
  Extracti Taraxaci, q. s.

Ut fiat massa in pilulas xxx dividenda. Conspergentur pulvere radicis Iridis florentinæ. S. secunda vel tertia quaque hora pilula sumenda.

CHAPTER XIV.

HYPERÆSTHESIA OF THE SPERMATIC PLEXUS.

This hyperæsthesia[1] is manifested by pain, which, in the male sex, attacks the testis. The patient complains of extreme tenderness and pain, which is generally limited to one point of the testicle, is increased by pressure and movement, and from time to time attains such a height that the slightest touch is unbearable, and that the supine position alone affords some relief. There is but trivial swelling of the testicle. The epididymis and spermatic cord are also attacked by the neuralgia, in which case the mere weight of the testicle is agonizing, and the patient has no rest without a suspender. These symptoms are often accompanied by pains in the back and legs, and by great irritability of the stomach, causing frequent vomiting.

The reaction upon the mind is greater here than in other neuralgic affections; the patient loses all zest for life and its enjoyments, and looks to castration as his sole hope of relief. I had one patient of this kind, who was attacked at the time he was engaged to be married. In spite of the serious objections of a celebrated surgeon, whom I called in to consultation, and notwithstanding my urgent representations of his peculiar relation at the time, he insisted upon the operation, which was undertaken to prevent any more serious result. Eight days later a pain supervened in the remaining testicle, which the gentleman, however, as the wedding was approaching, preferred retaining; he soon enjoyed a perfect recovery. Excepting that there were a few dilated vessels, there was no trace of any abnormal condition. Sir Astley Cooper has removed the testicle, against his will, in three cases, in all of which he found the testicle to be perfectly healthy.

The affection continues for months and years, with free

---

[1] Astley Cooper; Observations on the Structure and Diseases of the Testis. Chapter II., on the Irritable Testis; London, 1830.

CHAPTER XIV.

HYPERÆSTHESIA OF THE SPERMATIC PLEXUS.

This hyperæsthesia[1] is manifested by pain, which, in the male sex, attacks the testis. The patient complains of extreme tenderness and pain, which is generally limited to one point of the testicle, is increased by pressure and movement, and from time to time attains such a height that the slightest touch is unbearable, and that the supine position alone affords some relief. There is but trivial swelling of the testicle. The epididymis and spermatic cord are also attacked by the neuralgia, in which case the mere weight of the testicle is agonising, and the patient has no rest without a suspender. These symptoms are often accompanied by pains in the back and legs, and by great irritability of the stomach, causing frequent vomiting.

The reaction upon the mind is greater here than in other neuralgic affections; the patient loses all zest for life and its enjoyments, and looks to castration as his sole hope of relief. I had one patient of this kind, who was attacked at the time he was engaged to be married. In spite of the serious objections of a celebrated surgeon, whom I called in to consultation, and notwithstanding my urgent representations of his peculiar relation at the time, he insisted upon the operation, which was undertaken to prevent any more serious result. Eight days later a pain supervened in the remaining testicle, which the gentleman, however, as the wedding was approaching, preferred retaining; he soon enjoyed a perfect recovery. Excepting that there were a few dilated vessels, there was no trace of any abnormal condition. Sir Astley Cooper has removed the testicle, against his will, in three cases, in all of which he found the testicle to be perfectly healthy.

The affection continues for months and years, with free and, as hyperæsthesia, it attacks the female sex more frequently than the male. I have only met with one case of this kind occurring in a man of thirty-eight years of age, who complained of pain at the occiput, vertigo, and the frequent sensation as of an ejaculation of semen, without erections or any discharge from the urethra, or turbidity of the urine from an admixture of semen. In females this species of hyperæsthesia is generally due to a centric cause, and is complicated with nymphomania.

---

[1] Astley Cooper; Observations on the Structure and Diseases of the Testis. Chapter iv, on the Irritable Testis; London, 1830.

A pain of a neuralgic character has also been observed, and described as affecting a sexual organ in females, which is within the range of the hypogastric plexus, the uterus.[1]

The malady is characterised by the following symptoms: there is pain at the inferior portion of the abdomen, along the brim of the pelvis, and in the lumbar region. The pain is increased by the upright posture and by exercise, it diminishes when a horizontal posture is assumed. From time to time more violent paroxysms supervene, especially previous and immediately subsequent to menstruation; they disappear again on the application of proper treatment, and leave the usual permanent tenderness. The uterus is extremely sensitive to the touch. Excepting, however, a little swelling or rather tension of the cervix uteri, there is no departure from the normal structure and form, nor is it to be discovered during the further course of the disease. Menstruation often continues to be effected duly, though it may become scanty, and cease altogether. The intestinal canal is torpid, but strong purgatives instantly bring back violent attacks of pain.

Excessive bodily exertion, at a time when the uterus is peculiarly irritable, during the catamenia or the persistence of the lochia, is apt to bring it on, the patient having been previously subject to dysmenorrhœa, and being endowed with a generally irritable habit.

A cure is effected with great difficulty, and there is a great tendency to relapse.

To treat the complaint successfully, the horizontal posture, continued for a considerable time, even after the pains have abated, is absolutely necessary. Blood is recommended to be abstracted locally, by the application of cupping to the sacral and hypogastric regions, especially at the commencement of the disease. Mild narcotics may be exhibited by the mouth and by enema. Counter-irritation to the small of the back, in the shape of blisters or setons, and hip-baths, are advisable; and if the powers of the constitution are low, and there be an hysterical diathesis, we must have recourse to steel. In some cases a good result has been obtained by the employment of mercurials, though they should only be exhibited at the commencement, and while there is considerable vigour.

---

[1] See—Robert Gooch, the Irritable Uterus, in—an Account of some of the most important Diseases peculiar to Women: London, 1831, p. 299.

pain in the back, we find that in spinal meningitis it is the uniform symptom. It is here much augmented by every movement of the trunk or the extremities, whether spontaneous or passive, and is not increased by external pressure applied to the back. At the same time we often meet with rigid, painful contractions of the dorsal muscles or the muscles of the extremities. But even without the contractions, the pain is of a kind to prevent muscular action, and gives rise to an amount of immobility often inducing an erroneous assumption of paralysis. It is rarely persistent, and commonly has remissions.

In myelitis the pain is circumscribed; it corresponds to the locality of the disease, and is deep-seated. It is associated with paralysis, chiefly of the inferior extremities, varying in degree, and involving the sphincters. Besides actual pain we also met with other alterations of sensation, and especially with formication. Movements of the limbs do not, in this case, increase the pain in the back. According to the seat of the inflammation there are often painful sensations in the extremities, on the cutaneous surface of the trunk, or in the viscera.

When myelitis is associated with disease of the vertebræ, it is characteristic that the pain of the back is excited and increased by the application of pressure, as well as by other external means of irritation, as by passing a hot sponge over the part.

We have finally to allude to the intense pains in the back, the trunk, and the extremities, caused by morbid growths, and especially those of a carcinomatous character, vegetating within the spinal cord, or on its membranes. In this case, lancinating pains, which dart with the rapidity of lightning from the dorsal and lumbar region to the immovable and paralysed limbs, are characteristic. Osteomalacia, which fortunately is a rare disease, is accompanied by pains of this description. In the year 1840 I attended a lady of forty years of age, in conjunction with Dr. Schönlein, whose right mamma had four years previously, after violent mental excitement, become attacked with scirrhus, which was being gradually developed. Six months before the date mentioned a pain supervened in the lumbar region, accompanied by difficulty of moving the lower have since removed all uncertainty on the subject. Longet[1] has demonstrated, that if the lumbar portion of the cord be divided in one of the larger animals, and the poles of a galvanic pile are applied to one or both of the posterior tracts of the lower section, no evidence is afforded of sensation or movement in the lower extremities, whereas violent pain and consequent movements result in the anterior extremities the instant the poles are applied to the posterior columns of the upper portion of the cord. Mechanical irritation is followed by similar effects, though in a lower degree. During etherisation, of which we shall have occasion to speak in detail in the chapter on anæsthesia, the posterior tracts of the spinal cord equally prove to be insusceptible of any species of irritation, as shown in Longet's and Flourens' experiments.

The *surgical* observations, almost without exception, refer to the *loss* of motion and sensation during and after injury of the spinal cord. In but few of them the pain is spoken of as a main feature, and among these I have discovered but one which confirms the results of the experiments. A patient who had fallen upon his back, complained of pain in the hips and in the dorsal vertebræ; the lower extremities were paralysed; the dorsal pain became daily more severe; and delirium and asphyxia having supervened, death ensued. At two points of the posterior surface, on a level with the fourth and fifth vertebræ, the meninges were lacerated, and the substance of the spinal cord had passed through the aperture.[2]

Pain is a frequent accompaniment of morbid conditions of the spinal cord, and by the complication with other phenomena we may not only recognise the existence, but also the character of the organic change. The relation to motility more particularly assists in determining the diagnosis. The pain is also characterised by being rarely confined to the back, whether in a limited or extended space, but extends to the extremities (chiefly the lower) and the trunk. On the occurrence of cerebral symptoms it ceases or becomes less conspicuous.

If we regard the diseases individually in reference to the back against the wall or the chair, or by walking up and down. If anybody assisted him in undressing he would turn round suddenly in the greatest excitement, and request that his back be taken care of. It was evident that the removal of single parts of his dress caused great pain. He would stop when he began, and then suddenly throw them off by a jerk. The pain extended over the entire back, passing equally to both sides. A gentle pressure of one finger upon the skin brought on a violent attack of pain, during which the patient twisted about and stamped with the foot. If firm pressure was applied he did not complain; on the contrary, he found relief from it, for which reason he took refuge to strong pressure and powerful friction. Four years previously, shortly before the attack of the pain, he had suffered from hæmorrhage from piles, which ceased on their removal by excision. The back exhibited traces of the various remedies applied, on the supposition of the affection being of an inflammatory character; but the treatment had remained ineffectual, or rather the pain had increased in severity.

---

[1] Anatomie et Physiologie du Système Nerveux, 1842, vol. i, p. 273.

[2] Ollivier; Traité des Maladies de la moëlle épinière, 3d edit.; Paris, 1837, vol. i, p. 503.

This hyperæsthesia rarely exists alone, and still less frequently is it idiopathic. From not attending to these points, and owing to certain symptoms having received an undue attention, a phantastic caricature has been dragged into neuropathology under the name of spinal irritation, which has found, and still finds, the more willing reception among the public, as it seems to hold out a simple and rational mode by which we may explain complex conditions. The following are the characters attributed to it:

There are pains at any point of the surface or within the body, and tenderness or pain at a corresponding region of the spine, the latter being excited by contact or pressure of the vertebræ; or if it be constant, it is increased by these measures. These neuralgic phenomena are often complicated with motor symptoms.

According as one or other portion of the spine is affected, the symptoms, which may affect one or both halves of the body, vary in character and intensity. If the upper portion of the cervical vertebræ is involved, the pain traverses the parts supplied by the cutaneous branches of the second and third cervical nerves, viz., the occiput, the margin of the maxilla, back against the wall or the chair, or by walking up and down. If anybody assisted him in undressing he would turn round suddenly in the greatest excitement, and request that his back be taken care of. It was evident that the removal of single parts of his dress caused great pain. He would stop when he began, and then suddenly throw them off by a jerk. The pain extended over the entire back, passing equally to both sides. A gentle pressure of one finger upon the skin brought on a violent attack of pain, during which the patient twisted about and stamped with the foot. If firm pressure was applied he did not complain; on the contrary, he found relief from it, for which reason he took refuge to strong pressure and powerful friction. Four years previously, shortly before the attack of the pain, he had suffered from hæmorrhage from piles, which ceased on their removal by excision. The back exhibited traces of the various remedies applied, on the supposition of the affection being of an inflammatory character; but the treatment had remained ineffectual, or rather the pain had increased in severity.

This hyperæsthesia rarely exists alone, and still less frequently is it idiopathic. From not attending to these points, and owing to certain symptoms having received an undue attention, a phantastic caricature has been dragged into neuropathology under the name of spinal irritation, which has found, and still finds, the more willing reception among the public, as it seems to hold out a simple and rational mode by which we may explain complex conditions. The following are the characters attributed to it:

There are pains at any point of the surface or within the body, and tenderness or pain at a corresponding region of the spine, the latter being excited by contact or pressure of the vertebræ; or if it be constant, it is increased by these measures. These neuralgic phenomena are often complicated with motor symptoms.

According as one or other portion of the spine is affected, the symptoms, which may affect one or both halves of the body, vary in character and intensity. If the upper portion of the cervical vertebræ is involved, the pain traverses the parts supplied by the cutaneous branches of the second and third cervical nerves, viz., the occiput, the margin of the maxilla, this author, on account of the copious and valuable observations which he offers.

The inferior extremities are the chief seat of the painful sensations; they are generally both affected at the same time, though not with equal intensity. The upper extremities follow next in point of liability to the affection, which generally affects the flexors; then the lumbar region, the thoracic parietes, and least frequently the face and the scalp. The pains are superficial, or penetrate to the deeper parts, the muscles, the bones, and the large joints. They are of a tearing, boring, crushing, or burning character, or resemble electric shocks; they are diminished by pressure and friction, and are increased by motion; they never fly from one limb to another. Paroxysms alternate with free intervals, which, however, are not entirely exempt from annoying sensations, as numbness, formication, or debility. The attacks of pain are generally more frequent and severer at night. When they come on, the muscles, especially those of the calves, contract spasmodically, causing the most intense agony. At other times the muscles tremble and oscillate. Trivial irritation, such as the mere approach and passage of the hand, may suffice to produce violent reflex action in the muscles of the thigh and leg. Colour and temperature are unaltered, and no œdema is to be found in any part.

The affection commonly comes on suddenly, and runs its course rapidly. It rarely is of short duration or of varying intensity. If properly treated, it lasts from three to six days. When left to itself, the disease may at times disappear as rapidly; but it generally endures for weeks or months. It may exist as an isolated affection, or it may be associated with lead colic and paralysis; it frequently alternates with colic. It may coexist with paralysis, but the two in that case affect different parts, the latter as a rule appearing in the upper extremities and in the extensors.

The causes of arthralgia saturnina are identical with those of lead colic. Persons working in sugar of lead manufactories, and especially those engaged in the fabrication of minium, are most liable to this variety of neuralgia, which is second in frequency only to lead colic.

Two sections recorded by Tanquerel exhibit no visible changes.

It is reserved for future investigations to subject the spinal cord to a chemical analysis; and this is the more to be desired, as in cases of epilepsy and apoplexy, resulting from poisoning by lead, particles of the metal have been traced in the brain.[1] A cure is most rapidly and safely effected by the daily employment of warm sulphur baths, made by adding five or six ounces of the sulphuret of potassium to a bath. If recovery is slow, it may be accelerated by the exhibition of drastic purges and opium. The best safeguard against a relapse is the avoidance of the noxious trade.

---

[1] See Todd: Practical Remarks on Gout, Rheumatic Fever, and Chronic Rheumatism of the Joints, 1843, p. 23.

CHAPTER XVI.

SENSIBILITY OF THE BRAIN.

Experimental evidence.—The earlier experiments made upon living animals to determine the sensibility of the brain, were conducted in an extremely unsatisfactory and coarse manner, so much so that the exact lesion was not even determined after death. This reproach applies to such men as Haller[1] and Zinn, the results could not therefore be very trustworthy. The newer method of conducting the experiments has been more promising, and has yielded much fruit in the hands of men like Magendie[2] and Longet.[3] The experiments instituted by them upon rabbits and dogs prove that the corpora restiformia, the posterior or inferior surface of the pons varolii, and the [illegible] and corpora quadrigemina, are the most sensitive, the slightest touch applied to these parts causing violent pain. When the animal is etherised, sensibility is as completely in abeyance in these parts as in the peripheral nerves, in [illegible] the posterior roots of the spinal nerves, and the posterior tracts of the spinal cord. The hemispheres of the cerebrum and cerebellum and the corpus callosum, are entirely insensible to any kind of injury. When these experiments are made it is necessary, as Magendie very correctly remarks, carefully to avoid irritating the sensitive branches of the fifth pair in their passage through the cranium.

Clinical experience corresponds with the results afforded by experiments. It proves that the brain is insensible to injury, but it also demonstrates that when, as a subsequent result, inflammation, suppuration, softening, and induration of the cerebral matter ensue, pain makes its appearance. It is a remarkable phenomenon, that the portions of cerebral matter which have penetrated through the wound in the cranium, even when in a state of inflammation and fungous degeneration, are insensible to pressure or incision.

---

[1] A. v. Haller, Opera Minora, vol. i. p. [illegible], Lausanne, 1763.

[2] Leçons sur les Fonctions et les Maladies du Système Nerveux; Paris, 1839, vol. i. p. [illegible]

[3] [illegible] et Physiologie du Système Nerveux, &c.; Paris, 1842, vol. i. pp. 426 and [illegible]

With the exception of atrophy of the brain, none of its diseases occur unaccompanied by pain. This pain is generally characterised by the following peculiarities: it is permanently confined to a larger or smaller portion of the cranium; there is a sensation of pressure, tension, or pulsation, or the pain has a shooting, tearing, or rolling character; it varies in intensity; it is excited and exalted by bodily or mental fatigue, by movement of the head, by an elevated temperature, by highly-spiced food, and by long and sound sleep: the pain is relieved by raising the head, or by assuming the erect position, or resting the head firmly against something; it possesses a remittent character; there are intervals, but during the intermissions the health is impaired; spasmodic action or paralysis, generally confined to one side of the face or trunk, supervene, or the organs of sense become afflicted with anæsthesia, and delirium follows; the pain abates, and ceases altogether as the paralysis and sopor advance.

It is a matter of much difficulty to define these features with accuracy sufficient for the purposes of diagnosis, as the organ is withdrawn from examination by a rigid osseous case; still one means of approach has been overlooked, which we ought certainly to avail ourselves of. It is a fact that during every vigorous and long-continued act of expiration, the brain is elevated, the cerebellum being passed against the tentorium, the cerebrum against the cranial bones; we may easily convince ourselves of the latter by placing the hand upon the fontanelli of a child while it is crying. The old surgeons acting upon a knowledge of this circumstance, recommended their patients, who suffered from penetrating wounds of the cranium, to cough violently or to sneeze, in order to promote the discharge of blood or pus. We may therefore employ continued expiration, or holding the breathing during expiration, in cerebral diseases, especially if it affects the surface, as a sort of substitute for the external pressure, which we so frequently have recourse to in the exploration of the abdomen or thorax. The patients alluded to generally complain of the headache being brought on by straining in defecation; for the purposes of diagnosis we may cause the patient to imitate this effort, by holding the breath for some time during expiration, while the abdominal muscles are contracted; this at once brings on the pain, or if it was present, increases it to the utmost. The same occurs in screaming, coughing, and vomiting. Similar experiments may be instituted during inspiration, during which the brain falls and approaches the basis of the skull;[1] we may thus obtain some information on the diseases affecting the base of the cerebrum and cerebellum.

We are more in the habit of using the influence of position and movement of the head, as a means of diagnosis. Swinging the head from side to side, stooping down, rising rapidly from the horizontal to an erect position, are apt to produce and augment the pain.

The modifications and relations of cephalalgia to definite diseases of the brain, are important in a diagnostic point of view. Before investigating them it is necessary to point out that, in order to determine the existence of the pain in these diseases, it is even more necessary than in affections of other organs, to have an accurate history and a continued series of observations of the patient. This is necessary, not only on account of the longer intermissions, but also on account of the recurrence of pain when other symptoms, and especially paralysis, supervene, and on account of the loss of memory which ensues in many cases. For this reason the observations collected in private practice are peculiarly valuable.

Pain frequently accompanies morbid growths developed upon the surface, or within the substance of the brain; it prevails especially in the latter case.

Tubercular deposit.—Wilhelmina M—, aged 4 years, had been subject to headache from her second year, commencing after scarlet fever, and gradually increasing in severity. I was called to see the child in October, 1830. It pointed to the forehead as the seat of pain; its mother related that the paroxysms of pain recurred repeatedly during the day, and that when they were at their height, retching and vomiting took place. During the remissions the child was much exhausted, took no interest in the games of its playmates, and was very somnolent. The extremities were emaciated, the abdomen swollen and hard, the cheeks puffy, the complexion yellowish, the skin flabby and dry, the appetite capricious, and the bowels generally constipated. The erect posture was not borne long unless the head was supported. If the head was moved from side to side, which I attempted myself several times, the child evidently suffered pain, and began to cry. The various remedies exhibited had no effect, leeches were applied from time to time, the ung. antimonii potassio-tartartis was rubbed in at the nape of the neck, and applied to it. At the beginning of December the debility increased; she was no longer able to leave her bed; there were febricitations and continued somnolency. The belly fell in, and hard tumours of mesenteric glands could be distinctly felt. On the 7th December, profound sopor occurred; on the 8th, the right arm was convulsed; and on the 9th death ensued.—*Sectio cadav.:* After removing the skull-cap and the dura mater, the arachnoid covering the cerebrum was found opaque, and along the falciform process it was covered with some small albuminous exudations. The hemispheres were of a firm consistency, and the medullary vessels were injected. The lateral ventricles, especially the left, were dilated, and filled with a quantity of clear serous fluid; their parietes were softened. At the base of the hemispheres of the cerebellum, there were four tubercular masses disposed pairwise on each side. The larger ones were of the size of a small walnut, and of a rounded shape; they were seated in the biventral lobe, one on the right, the other on the left side; they lay in a cavity, and were so loose that mere pressure on the surrounding parts caused them to fall out; they were hard and of a yellow colour, the lesser ones were more deeply imbedded, occupying the innermost divisions of the posterior inferior lobe, and they were more firmly connected with the adjacent cerebral tissue. The liver was pale in colour and of considerable size, so as almost to fill both hypochondria. The mesenteric glands were much swollen, and contained tubercular deposits, which, at many points, had passed into softening.

---

[1] Ravina found that during inspiration he was able to introduce a quill between the skull and the brain of a pointer. On placing a cork cylinder divided into degrees upon the brain, it sank during ordinary inspiration one line, during strong inspiration three lines. If a cylindrical glass tube filled with water was placed upon the brain, the fluid disappeared during inspiration, and returned discoloured with blood on expiration. See Lund: Physiologische Resultate der Vivisectionen neuerer Zeit, p. 149; and the still more recent experiments of Dr. Ecker, in Physiologische Untersuchungen über die Bewegungen des Gehirns und Rückenmarks, 1843, pp. 27—102, and pp. 112—122.

Second case.—Albert S—, aged 5 years, whose physical and intellectual development was retarded for his age, for he was unable to speak connectedly and fluently, was emaciated and potbellied; had complained for more than a year of pain in his head, chiefly in the forehead. The mother, who was a poor widow, obliged to earn her bread out of the house, was unable to devote the necessary attention to the boy, and did not call in medical advice until sopor and somnolency had set in. So it happened that at my first visit, on the 6th of July, 1832, I found a hopeless case of acute hydrocephalus; the symptomatic character of which, however, the history of the case, meagre as it was, established with sufficient accuracy. Death followed two days after with violent convulsions.—*Sectio cadav.*: The vessels of the pia mater and the medullary substance were much injected; the arachnoid was covered with albuminous exudations along the line of the falciform process; the ventricles of the brain were distended with a clear serous fluid; the septum lucidum, the fornix, and the parietes of the ventricles, presented a very soft consistency, and broke up under the pressure of the finger into a pulpy mass. In the upper posterior lobe of the right hemisphere (lobus semilunaris), at the distance of a few lines from the posterior edge, there was a tubercular deposit, of the size of a cherry kernel of a yellowish colour and hard consistency, projecting somewhat above the brain, and easily detached; the place where it had lain was marked by a small fossa. In the medullary matter of the same hemisphere another tubercle was found near the corpus rhomboideum, of the size of a pea. The mesenteric glands were much enlarged, and filled with tubercular matter.

Third case.—William E—, æt. five years, had for some time attracted the attention of his parents by a change in his character, by what they termed a dreamy habit; he resembled a person in a fit of abstraction, or a half-drunken man, and had a rolling gait. A nasal blennorrhœa, which had continued from his birth, had ceased six months previously; the boy had since frequently complained of violent, tearing pains in the right ear. I was called to see him on the 31st of May, 1830.

Vomiting had supervened, which was especially brought on by the erect position of the head; there was constipation, sopor, and much fever. The abdomen was sunk to such an extent that a deep cavity was formed between the crest of the ilium and the projecting ribs. The pulse became slow, respiration irregular and grunting; the pupils became dilated and immovable, the eyeballs rigid, the conjunctiva reddened, and the power of vision ceased. Vigorous treatment was ineffectually adopted, and, on the 6th of June, death ensued with violent convulsions.—*Sectio:* After removing the skull-cap, the brain rose like an elastic body that has been relieved from pressure, and could not be replaced within its bony case; the dura mater was tightly stretched over the gyri, which were closely compressed. The arachnoid was opaque, adherent to the pia mater at the vertex, and covered with small exudations resembling patches of muguet. The medullary substance of the cerebral hemispheres was surcharged with blood, and of very firm consistency. The ventricles were distended with a quantity of yellow serous fluid, and their parietes and the fornix softened. At the base of the brain a considerable sero-albuminous extravasation covered the optic commissure. In the medullary substance of the right hemisphere of the cerebellum, a tubercular deposit, of the size of a small cherry, was discovered; it was of a yellow colour and very firm texture, and on being removed, which was easily done, a cavity remained in the surrounding medullary tissue. A large quantity of clear serous fluid bubbled from the spinal canal, especially when pressure was exerted on the ribs.

Cases of hydatid tumours.—1. In the year 1821, I made a post-mortem examination of a girl of fifteen years, who had been under the care of Dr. Formey; she had menstruated for a year, had constantly complained of pain at the right side of the head, and died with symptoms of acute hydrocephalus. The arachnoid was found opaque and thickened; the gyri of the cerebrum were considerably flattened; the ventricles, particularly the right one, were excessively distended; and they each contained about four ounces of a whey-coloured fluid. In the right lateral ventricle there was a tumour of the size of a pigeon's egg, proceeding from the choroid plexus, and consisting of an hydatid mass interwoven with tumid vessels. On the floor of the posterior horn of the same ventricle there was an erosion of the cerebral matter.

2. A girl of six years was almost constantly complaining of headache: she generally supported her forehead on her hand; and even when asleep, rested the head on the edge of the bedstead. She lost her liveliness, and became dull and apathetic. A fortnight previous to her demise, an acute cerebral affection supervened, with vomiting, increase of pain, amaurosis of the left eye, coma, and convulsions. — On removing the cranium and dura mater, the arachnoid was found covered with small granulations all along the falciform process. The right lateral ventricle was gorged with serous fluid, while the left was almost empty. On the anterior half of the left thalamus opticus, a white substance of the size of a bean, and of membranous structure, was found. More minute examination proved it to be a collapsed and defunct hydatid, the inner surface of which was covered with a quantity of small granulations of the size and appearance of sabulous bodies.[1]

From a comparison with the observations of other authors in Nasse's[2] instructive and critical work, it follows, that of all the symptoms accompanying tumours in the brain, headache is the most constant. From Andral's[3] collection of cases it also appears, that out of thirty-six cases of tumours in the cerebellum, there was headache in twenty-six. Lastly we find, as the result of Abercrombie's eleven observations of cerebral tumours, that were mainly accompanied by pain, and of which nine were tubercular and two albuminous, that three only were seated in the cerebrum, three in the cerebrum and cerebellum, and five in the latter only. They occurred chiefly in infancy, which my own experience ratifies; and they were frequently complicated, as my own experience equally confirms, with tubercles of the abdominal and thoracic viscera.

---

[1] Rudolphi; Entozoorum Synopsis, p. 183. Echinococcus hominis: 'Vesica externa simplex vel duplex, cujus superficiei internæ insidunt entozoa plurima, arenulam mentientia, quorum corpus, obovatum, caput uncinorum corona, et osculis suctoriis instructum.'

[2] Ueber Geschwülste im Gehirn, an Appendix to the Translation of Abercrombie's Work on the Diseases of the Brain and Spinal Cord; Bonn, 1821, p. 66.

[3] Clinique Médicale, 3d edit., vol. v, p. 729.

Among the tumours within the cavity of the cranium which are generally accompanied by pain, we must also mention aneurismal tumours, both of the vertebral arteries and of the carotids. The pain is generally of a pulsating character.[1]

In the cases of cerebral carcinoma that have been hitherto published, pain was a very frequent symptom, both when the disease was seated in the cerebellum and when it was in the cerebrum; the latter was the case in the majority of instances.[2] The pain often presented the peculiar character of carcinoma; sometimes it was more of a neuralgic character, radiating from one point to other parts, and in either case it associated itself with similar pains of the trunk and extremities. Among the structural morbid processes of the brain, softening and the formation of abscesses are most frequently and uniformly accompanied by pain.

Those trustworthy observers, Lallemand, Rostan, Andral, and Fuchs, are unanimous as to the symptoms of softening of the brain. The pain either precedes the actual occurrence of the disease for a considerable time, or commences with the first stage and continues during the second. I watched the case of a young woman of 28 years of age, in the two hemispheres of whose brain patches of softening were found; the case will be detailed in the section on cerebral paralysis; but it bears upon the present question, as a severe oppressive headache preceded the actual eruption of the disease for seven years. The pain recurred at irregular intervals, enduring for days and even weeks; was diminished by cold; but became unbearable during the warm season; so that the only way in which the patient could obtain relief was by remaining in a cool cellar. If the patient, even after sopor has supervened, answers to a repeated, loud question concerning the seat of the pain, by slowly carrying the hand to the side of the head opposite to the paralysed side, it is considered by Rostan to be pathognomonic of the disease. If this patient is of a very indolent habit or advanced in years, spontaneous complaints of pain in the head cease, as they also do after the sopor has taken place.

---

[1] A collection of the Cases hitherto observed is given in Stumpf; Dissertatio de aneurysmatibus arteriarum cerebri; Berolini, 1836, pp. 11—18.

[2] See Andral's Comparative Collection of 43 Cases, in the Clinique Médicale, vol. v, p. 637.

Pain is an almost constant companion to that interesting form of softening, which affects the corpus callosum, septum lucidum, fornix, and the ventricular parietes, and has been termed central softening by Abercrombie,[1] whose admirable researches have first served to draw attention to the affection. Among sixteen cases communicated by him, pain is only absent in one. The following case is the one in which I have found it most intense:

A girl seven years of age was seized on the 27th of May, 1835, with headache, vomiting, diarrhœa, and febricitations. On the following days there was distinct evidence of a cerebral affection; the little patient complained chiefly of a permanent deep-seated pain in the head of great intensity, rendering it impossible for her to sit up in bed, even for a few minutes. No remedy, either local abstraction of blood, or cold, availed to palliate the pain. Vomiting, photophobia, reddening of the conjunctiva, delirium, bed-picking, and collapse of the abdominal parietes ensued, and death occurred on the eighteenth day of the disease, after coma and convulsions.—At the post-mortem we found the cerebral matter charged with blood. The septum lucidum, the fornix, and the walls of the lateral ventricles, were converted into a shapeless pulp, which was so soft that slight pressure of the finger served to displace it. All the remaining parts of the cerebrum and cerebellum presented a normal consistency.

Induration of the cerebral tissue occurs much more rarely than softening. The following case is an instance of induration giving rise to enduring pain:

A girl of six years of age had fallen down stairs three years previous to my being consulted about her. She complained of constant pain in the forehead, which at times was so violent as to cause her to scream out. The right eye began to squint; and six months previously a discharge of yellow pus took place from the right ear, though without exerting any influence upon the pain. The child was apparently in good condition; had a healthy complexion; its muscular development was good; it enjoyed a good appetite, and the bowels were regular. When the mother brought her to me on the 8th of November, 1823, she stated that in addition to the above-mentioned symptoms, the child had been much indisposed for some days; that she vomited all her food, was constipated, and frequently was attacked by flushing of the face and vertigo. The pupils were dilated and sluggish; the otorrhœa continued uninterruptedly. On the following morning I found the pulse accelerated, the face very red and puffy, and the eye fixed. Vomiting occurred frequently, and the constipation continued. Leeches, cold lotions applied to the head, and the exhibition of purgative medicines, produced no effect. Sopor supervened, which could only be momentarily broken by calling out loudly and shaking the patient. She screamed out frequently. On the 18th of November the pulse became excessively quick; convulsions seized both sides of the body; and on the 19th she died calmly. The otorrhœa continued up to the last moment.—*Sectio:* On the left hemisphere of the cerebrum, at about the middle, there was in the dura mater an osseous concretion, of irregular shape, and about a quarter of an inch in diameter. The arachnoid and pia mater were adherent along the falciform process, and at several other points, to the dura mater. The arachnoid was opaque throughout, and of an opalescent character. The brain itself appeared extremely bulky, so that on removal from the skull it resembled the brain of an adult. Its consistency was very considerable. The roof of the ventricles was arched, and presented distinct fluctuation. On puncturing the left lateral ventricle, which was much distended, about four ounces of a yellowish serous fluid exuded. The septum lucidum was of a pulpy consistency, and torn through in the middle. At the inner edge of the two posterior lobes of the cerebrum there was a spot of indurated substance of half an inch in circumference, and of the colour of bees-wax. The posterior edge of the two hemispheres of the cerebellum were so firmly adherent to the dura mater, that it was necessary to use the knife for the purpose of separating them. To the extent of a quarter of an inch on both sides of this spot, the cerebellum was degenerated into a hard mass, the transverse section of which presented a jagged appearance and yellowish-brown tint, owing to the admixture of the yellow (sic) cerebral substance. The remainder of the cerebellum was of very soft consistency, and its limits sharply marked off. The surfaces of both petrous bones were normal.

---

[1] Pathological and Practical Researches on Diseases of the Brain and Spinal Cord; Edinburgh, [illegible], pp. 107–130.

Of all the diseases of the brain, none is so frequently or so uniformly accompanied by pain as the formation of abscesses, either in the cerebrum or cerebellum. In Lallemand's 'Recherches Anatomico Pathologiques sur l'Encéphale et ses Dépendances,' vols. i and ii, nineteen cases of abscesses are communicated, among which fourteen are expressly stated to have been accompanied by pain. In the cases mentioned by Abercrombie, it was never absent. On one occasion I have observed that it had a peculiar pulsating character.

In September, 1822, I was consulted by a slater, æt. 22, who had fallen from a high scaffolding a fortnight previously. He came down upon his feet, and had since complained of weakness, chilliness, and darting pains in the legs. On account of his utter poverty he was received into the hospital of the Charité. While quitting the bath he was suddenly attacked with complete paralysis of the left arm and leg. His consciousness, power of speech, and features remained unaffected. There was, however, a squint in the left eye, and the patient complained of a violent boring pain in the fundus of the corresponding orbit; but both disappeared on the application of general and local bloodletting. At the same time a pain supervened at the vertex, which gradually increased, and which the young man compared to the sensation of a bird pecking away his brains. A short time previous to the fatal issue, which occurred four weeks after the accident, sensibility was restored to the paralysed limbs.

Post-mortem examination of the head.—The arachnoid was opalescent, and between this membrane and the pia mater there was a sero-gelatinous exudation. The brain presented a firmer consistency on the left than on the right side. The medullary substance was dotted with red spots. Both lateral ventricles contained a yellow serous fluid, the right more than the left. At the point of junction, between the corpus striatum and the optic thalamus of the right side, I found a cavity filled with thin, yellow pus, the walls of which were invested with a retiform membrane traversed by a few small vessels. The former was rendered more distinct by pouring upon it a small jet of water.

In otorrhœa, which is generally accompanied by disorganisation, chiefly of a tubercular character, of the petrous portion of the temporal bone, the supervention of cephalalgia is a symptom of considerable importance, as it indicates the development of a cerebral affection. In twelve cases which I have analysed, I found suppuration and the formation of abscess in the vicinity of the affected bone, with enduring pain on the affected side of the head, after the supervention of which the otalgia had generally ceased.[1]

Hæmorrhage in the brain is much less frequently accompanied by pain than other diseases of the organ. In these cases, which may be considered as parallel to the occurrence of pain in rupture in the thoracic and abdominal viscera, the patient utters a sudden shriek; he has the distinct sense of laceration occurring in the brain. Vomiting supervenes, and the pulse becomes small and oppressed. After an interval of varying duration, the mind becomes clouded, sopor and paralysis supervene; the disease then takes its usual course, and almost always terminates fatally. Cheyne[2] describes a case of this kind, which happened to a naval officer, æt. 33, who while sitting at breakfast was seized with nausea, vomiting, and such intense headache that he said he felt that one half of the brain was torn from the other, and that his end was approaching. He rubbed his benumbed hands; complained constantly of the enormous pain; was seized with rigors about midday; became comatose towards evening, and died at midnight.

The post-mortem showed both hemispheres torn asunder by an enormous hæmorrhagic extravasation, which had destroyed the corpus callosum and had penetrated to the base. Abercrombie[3] communicates several illustrative cases. Headache may also occur consecutively in connection with cerebral hæmorrhage, if an inflammatory condition is developed in the vicinity of the extravasation. In that case a characteristic feature presents itself in the shape of concurrent pain and contractions in the paralysed muscles, which had previously been relaxed.

---

[1] See Lallemand; Recherches, &c., vol. ii, pp. 80—172; and Abercrombie, loc. cit., pp. 31—39.

[2] Cases of Apoplexy and Lethargy, with observations upon the Comatose Diseases; London, 1812, p. 110.

[3] Loc. cit., p. 218, et seq.

Finally cerebral pain occurs as one of the most frequent accompaniments of meningitis, and forms the chief subject of complaint on the part of the patient, as long as consciousness continues or as soon as it returns.

The cerebral diseases which we have alluded to, are so frequently limited to certain regions and portions of the organ, that they may serve to elucidate a point of extreme diagnostic importance, as to whether the seat of the pain corresponds to the seat of the disease? The question may be generally answered in the negative. Circumscribed alterations not unfrequently give rise to pain in the entire head or in one half; derangement in the cerebellum is often characterised by pain in the forehead; in some patients the pain shifts about, while others again always feel the pain at that part of the head which happens to occupy the lowest position.

We are as little able to determine the especial nature of the organic change, by the character of the pain, excepting in those rare cases of rupture. The sensation of boiling, hammering, trickling, even if increased by bending down and shaking the head, as frequently accompanies hard immovable tumours, as accumulations of pus and other fluids. The sensation as if the head were ready to burst, accompanies diseases of trifling extent, while tumours of great bulk excite no feelings at all commensurate with their size. The situation of the disease affords no satisfactory key to the intensity and varieties of the pain. Though it is not to be denied that diseases of the cerebellum and the parts near the pons varolii are very commonly accompanied by pain, we must not forget the vicinity of the most powerful sensory nerve, the trigeminus, nor overlook the fact that the great majority of diseases of the cerebrum are associated with pain In what manner are we to reconcile these facts with the results of physiological experiments? Assuredly not by the theory that insensible organs become sensitive during a state of irritation and inflammation: we can have no stronger proof of the fallaciousness of this argument than presented by the fact of a portion of brain which has been forced out of the skull, and is attacked with inflammation, yet continuing painless. We obtain more information from the effect produced by pressure exerted upon the brain. Both hemispheres may be extirpated in a living animal without inducing paralysis, whilst the injection of a few drachms of fluid into the cranial cavity, produces hemiplegia of the opposite side. This is owing to the uniform pressure exerted upon the distant motor nerves. In the same way irritants act upon the sensitive points, though the seat of the former may be at a great distance; the different parts of the brain seem in a measure to be responsible for one another, and probably the organs of the living brain, an organ, be it remembered, enclosed in unyielding walls, may contribute to the propagation of an irritant influence; surgical observations of penetrating wounds of the skull, as well as the effect already alluded to, of holding the breath, appear to confirm this.

It is necessary that more attention should be paid to the circumstances accompanying organic cerebral affections, than they generally receive. The prevailing fault is a one-sided mode of viewing things; and, even in post-mortems, it is usual, as soon as some palpable lesion, as a tumour in the brain, has been discovered, to desist from a further examination of other parts of the organ. This, however, is often of extreme importance, not only for the purpose of explaining new complications, but also to account for the change in the symptoms. Thus, cephalalgia accompanying tumours, is removed by the accumulation of serous fluids in the cavities and between the membranes, while it is increased by inflammation and softening occurring in the vicinity of the tumour. Intercurrent morbid conditions affecting the constitution of the patient, operate in an analogous manner. Acute exanthematic diseases, not unfrequently excite or increase cephalalgia; it increases before the supervention of the catamenia, and ceases after the period has passed; relief is generally afforded by the abstraction of blood.

There is another more general reason for the cessation of cephalalgia, even while the cause continues in operation, and this is the exhaustion of the irritability, by the irritation itself; upon this the remittent character of the pain depends in organic diseases of the brain. In rare cases we may even meet with regular periodicity.[1]

If from the present investigation, it results that there is much difficulty in the diagnosis of the exact character of the cerebral disease, accompanied by pain, and that it can only be approximatively determined by one who is well acquainted with the whole course of the disease, we must, on the other hand, be careful not to treat the distinction of this pain from other painful sensations in the head, as too easy; the danger of doing so is proved by the frequency with which the error is committed. The combination, the relation, and the mode of succession of the phenomena must be regarded, in order to prevent our confounding neuralgia, hemicrania, and sympathetic headache, with the affection we have been considering. The co-existent affection of the motor and intellectual sphere, fleet as it may be at the commencement of the disease, is of great importance. A momentary strabismus, when the pain is at its climax, is suspicious; a sense of numbness in one hand, or an entire extremity, is significative; short attacks of unconsciousness and sopor, scarcely admit of any doubt. The pain generally increases after sleep. In dyspeptic headache and hemicrania the pain may attain such a height as to prevent the other functions from being exercised; the patient condemns himself to the greatest quiet, both physical and mental; but neither the motor nor intellectual energy of the individual is at all affected. Nor must we overlook the fact that the cerebral pain bears no relation to the other symptoms. The patient complains of the former alone, and it is not obscured by accidental affections of other organs, as is so often the case in hemicrania and in dyspeptic headache. Furthermore, the succession of the phenomena is of importance, as well as the gradual disappearance of cerebral pain, as soon as the paralysis and loss of intellectual power supervene. Finally, we must consider the intervals, which are rarely free from traces of the disease, whether of a physical or psychical character, whether manifested as irritability or sluggishness, as inability to undergo fatigue, constipation, or stubborn reaction against purgatives; the duration of these intermissions may, accidentally or intentionally, be at any time, shortened by influences affecting the brain. There are also other circumstances which may be made available for the diagnosis; such as the exciting cause (for instance, an external injury,) and the age of the patient. Thus cerebral pain occurring in childhood, at which period other varieties of headache are very rare, excites a suspicion of the existence of tubercle. Such a surmise would be strengthened by the coexistence of tubercles in other organs, in the lungs, the mesentery, as well as by the fact of catarrhs and blennorrhœa of the ears or nose, having preceded or accompanying the affection.

---

[1] Abercrombie; loc. cit., pp. 166, 173.

The assumption of an organic cerebral disease generally terminates all doubt on the score of diagnosis, and the consequence is that the technical treatment of cerebral pain has not enjoyed any progress. And, in fact, we advance but little by the routine of prescriptions, though we may do something by attending to two points:

1. No case should be treated without a previous careful examination of the head. It is unaccountable that whilst a complaint of pain in the abdomen or thorax is at once followed by an ocular examination of the parts, the practitioner does not afford equal attention to the head, although injuries of the head are not unusual. When the examination is made, the patient himself often recalls to memory a fall or a blow which he had received not long previously. If we can discover a cicatrix, an induration of the integuments, or an indentation of the bone, we must assure ourselves, after removing the hair, of its extent, and not fail to employ vigorous remedies; of these there is none equal to a crucial incision, and the insertion of a large issue. I have seen a remarkable instance of the success of such treatment, and cannot omit introducing it here.

In the year 1827 I was called to a girl of 24 years of age, whom I found considerably emaciated, affected with aphonia and amblyopia on both eyes. I ascertained from the relatives that she had for several years been subject to a pain extending from the occiput to the forehead, which had lately increased to the utmost pitch, and on every change of position, from the horizontal to the upright posture, was accompanied by vertigo and a sense of fainting. Memory and vision had become gradually impaired, and were quite destroyed; amenorrhœa, idiotcy, and a paralytic condition of the lower extremities, and at last œdema of the legs, had supervened.

The medical gentleman who had attended her before I saw her, considered the fatal issue inevitable. No light could be thrown upon the origin of this marked and advanced cerebral affection, by the history of the case; I obtained it by examining the head. I discovered a cicatrix in the bone on the right side of the occiput, marked by a deep indentation, and about half an inch in length. The relatives now remembered that the patient had met with a fall down stairs six years ago, and that subsequently she had been struck on the back of the head by a clothes-brush thrown at her in play by a younger brother. My deceased friend Dieffenbach, who convinced himself of the injury, and agreed with me as to the propriety of the treatment suggested, made an extensive crucial incision into the integuments sufficient to establish an issue with twelve peas. Suppuration was maintained for three months, with the most satisfactory result. The general health of the patient improved, the œdema disappeared, the pain diminished, vision returned, menstruation was re-established, and the feet gradually recovered their strength. The memory of the girl, however, had suffered so much, that she was compelled to resume her instruction in reading and in needlework. Six months later, the cure was so effectually established that the patient was able to enjoy the pleasures of dancing.

A proceeding similar to the one just detailed promises relief, and even a cure, even where there has been no local injury, provided it is not adopted too late.

2. As we have seen that inflammation is apt to supervene in the vicinity of organic disease of the brain, by which not only the pain is increased, but also the danger is magnified, antiphlogistic treatment becomes necessary; this is the more imperatively demanded, as the more violent paroxysms of cerebral pain are accompanied by vascular excitement. General and local bleeding by cupping and leeches, cold applications, and derivation to the intestinal canal, allay the threatened storm, which is often interpreted, especially when occurring in children, as idiopathic meningitis, and these remedies aid in preserving the patient.

At all events it is necessary to avoid violent and extreme measures; especially the shock of shower and vapour baths, and treatment by inunction and starvation.[1]

---

[1] [The treatment by inunction and starvation—Schmier- und Hunger-kur—has been especially recommended and employed by Professor Rust, who introduced it chiefly for the cure of inveterate syphilitic affections. The directions for the method to be pursued are so minute, and they are so little likely to be adopted in this country, that we may refer those curious in such matters for the details to Rust's Magazin für die gesammte Heilkunde, vol. i, 1816; or Phœbus, Handbuch der Arzneiverordnungslehre, vol. ii, p. 566.—Ed.]

CHAPTER XVII.

NEURALGIA CEREBRALIS.

Hemicrania, la Migrène.

After certain premonitory symptoms, of which chilliness, yawning, bulimia, anorexia, and irritable temper are the most frequent, or without any warning of the kind, one side of the head, and more generally the left, is attacked with pain; it is commonly circumscribed and limited to the supra-orbital and temporal regions, or it extends up to the hairy part of the head; at first trifling, it soon increases more or less rapidly, and is accompanied by a sense of weight and tension. The motor and intellectual functions of the brain increase the pain, for which reason the patient always courts quiet and solitude. Sympathetic affections of the branches of the fifth pair, and of the nerves of sense, are rarely absent. The eye of the corresponding side is painful; it weeps and appears smaller. Light and noise cause pain; scotomata and tinnitus aurium supervene. The hair is very sensitive to the touch, and occasionally stands on end. When the attack has reached its climax, and is approaching its termination, nausea and vomiting come on, and thus a quantity of mucous and bilious matter is got rid of. The attack is generally closed by a profound and refreshing sleep.

The duration of the paroxysms generally extends to several hours, though it may last an entire day and more. The intervals, of three or four weeks' duration, are generally distinguished by the patient enjoying perfect health; in the female sex hemicrania is commonly associated with the menstrual period, and occurs before or after it, but rarely during its continuance.

The disease runs a chronic course; it may be protracted for several years, or half the individual's life, without an essential alteration in the symptoms.

A predisposition is afforded by inheritance, by the female sex, and by early life. I have seen girls of seven or eight years of age attacked, whose mothers had been subject to this neuralgic affection. Tissot even asserts that persons who have not been subject to hemicrania up to their five and twentieth year, continue to enjoy an exemption. It has been a prevailing error since Tissot's time, to attribute too much influence to disturbances of the digestive organs in predisposing to the malady; they and mental affections are, however, undoubtedly the most common exciting causes.

Although we are not likely to confound this affection now-a-days with facial neuralgia, as older authors, Wepfer and Tissot, have done, we often find that it is not sufficiently distinguished from other kinds of cerebral pain. I refer to the preceding description of the pain accompanying organic cerebral affections, and now merely sum up shortly the characters by which we recognise cerebral neuralgia; there is a definite group of symptoms which recur in the same individual in a similar manner during the attacks; there is an alternation of periods of pain and freedom from suffering; and there is an absence of other nervous affections in spite of the long continuance of the disease.

Hemicrania generally diminishes in advanced age, or entirely ceases; in females it often terminates at the period of decrepitude. Febrile diseases, and the appearance of gout or impetiginous eruptions, often produce a similar result.

In our treatment, whether with a view to palliation or to a radical cure, we cannot be sufficiently on our guard against the abuse of medicines. During the attack, the recumbent position, with the head raised, affords relief, which is also promoted by darkening the room, by quietude, and by giving tepid tea to assist the vomiting. A mild clyster towards the end of the attack is beneficial to produce action of the bowels. Remedies applied to the head externally are unnecessary; the majority of patients find relief by compressing the head with a bandage, others prefer exposing it; but few benefit by heat or cold. The local abstraction of blood is to be avoided.

In attempting a radical cure, the state of the digestive organs must be attended to. If the secretions of the liver and intestinal glands are depraved, which is more frequently the case in men than in women, the natural or artificial mineral waters of Marienbad, Kissingen, or even Karlsbad, and the gum-resins (gummata resolventia) in combination with alkalies, are indicated. If there is atonic dyspepsia, we must have recourse to bitters, among which the menyanthes trifoliata is particularly lauded by Tissot. When we are satisfied of the purely neuralgic character of the affection, it is well to avoid any violent interference, and to bear in mind the chronic character of the disease, and the probability of its yielding with advancing life. The remedies most likely to be serviceable without producing any injurious effect, are the prolonged exhibition of an infusion of quassia, of menyanthes combined with valerian, of the waters of Spa or Pyrmont if there be an anæmic constitution, taken in moderate doses of from one to two wine-glasses in the morning before breakfast, even during winter; of bark or sulphate of quina if there be marked periodicity, or we may have recourse to sea bathing. Arsenic, in the shape of Fowler's solution, in doses of from four to eight drops three times daily, and nitrate of silver, from one third to half a grain twice a day, are sometimes of use. Counter-irritation, especially by discharging issues, is to be avoided. We should pay the greatest attention to the most minute regulation of the diet, a point in which the physician's directions are commonly neglected, whilst doctoring dilettanti are able to boast of persevering obedience.

HYPERÆSTHESIA PSYCHICA.

Hypochondriasis.

I apply the term *hyperæsthesia psychica* to that frame of mind in which abnormal sensations are excited and maintained by directing the attention to impressions; it is commonly called *hypochondriasis*.

To elucidate this position more fully, we may mention that in health the activity of the nerves of sensation is constant; it does not require to be produced by irritants, it is merely select food for our perceptive or reasoning powers; by directing the attention to the sensations, or to the details of an impression, we may give them a definite shape and a permanent character.

The stimuli that influence the sensitive functions are of an objective and subjective, or simply a subjective kind. Among the latter we yield to the stimuli of mental impressions a more extensive sphere of action than is commonly accorded them. Nobody doubts the effect of voluptuous thoughts, but the doctrine that pain may result from reflecting upon pain is objected to; and yet the result of a vivid impression of nausea, horrification, tickling or itching, which we are familiar with, is nothing but an abnormal sensation.

The corporeal manifestation of the ideal by means of sensation, occupies the same position as the corporeal manifestation of the ideal by motion; but it is not effected, unless it be to heighten the whirl of a sensual gratification. When it is the case, it shows itself in as marked a manner as the manifestation of a mental impression by motion; the best proof of this is the morbid condition which we are about to consider.[1] The hypochondriac is, so to say, a virtuoso on the sensitive nerves.

In hypochondriasis, doubts and anxiety about his health oppress the patient, and they generally take the shape of a conviction of a malady affecting a special organ, and in the first instance the stomach and intestinal canal with the digestive powers. The tongue and the fæces are examined, and there are frequent complaints about a weight, tension, burning, and fulness about the pit of the stomach; this is made out to be the seat of the disease: here we find the sensations which become more vivid the more frequently the mind is directed to them. The patient now ponders upon the cause of his malady, and a peculiar inclination to reading medical books, to consulting friends and doctors, is manifested. In this manner the vulgar prejudices and the prevailing medical system are reflected in the hypochondriac, just as social and political conditions are mirrored in mania. Every hypochondriac is at first a martyr to the wind. Eructations and flatulence are convincing arguments, and the generation of gases in the stomach and the intestines increases in the ratio of the attention bestowed upon the symptoms. In Broussais' times, the educated hypochondriac in France imagined himself afflicted with gastritis, and in the same manner the German of forty years since was tortured with atrabiliary follies, to which he was led by diligent contemplation and study of the delineations contained in Kempf's book. But the imagination does not deal exclusively with the hypochondria; the thoracic organs are also visited in a similar manner. The sensation of anxiety and dyspnœa is one which the hypochondriac most frequently induces spontaneously and augments. The motor action at the same time participates; the heart beats and pulsates irregularly. A suspicion of a disease of the heart seizes the patient, until an accidental catarrh directs his attention to the lungs. The distress and palpitation cease, and phthisis becomes the nightmare that absorbs every consideration, and in the same ratio the patient complains of pains in the chest; the cough becomes more and more urgent; and the sputa are carefully preserved and carefully examined. Not alone, however, in the abdomen and chest are the phenomena excited; they are also produced by imagination and reflection in the sensory relations of the head; hyperæsthesiæ of the nerves of sense, pains in the cranium and face supervene, there is weight and tension, vertigo, and oppression; an approaching attack of apoplexy tortures the patient; when he suddenly hears of cholera, his head is set at liberty, and the precursors of the mortal malady seize upon his devoted intestines.

---

[1] The influence of the will and the direction of the mind in producing and fixing sensations, has not as yet been properly applied to therapeutics. There are some indications on the subject in Dr. Lebenheim's Essay, Ueber die psychische Behandlung somatischer Krankheiten, in Wochenschr. fur die gesammte Heilkunde, 1838, p. 489.

We will now examine the patient a little more closely. He frequently presents a healthy, florid appearance; we find the abdomen soft, perhaps yielding a more extended tympanitic sound to percussion; the heart and lung sounds are normal, and the patient's troubles are alleviated by exercise, while they are augmented by indolence, which the individual prefers. The appetite is variable, according to the direction of the patient's thoughts. Nutrition proceeds undisturbed. The physician's mind is eased, but the patient finds no peace. He appears spellbound within the magic circle of his sensations, and he surrounds himself with stores of dietetic and medicinal substances. Here we see one fasting, there one who is constantly drinking cold water, another again consumes gallons of elixir vitæ. Let us lastly cast a look upon the state of our patient's mind and his feelings. In spite of the constant thoughts about impending death and pain, there is no tædium vitæ; the more physicians, the more he is satisfied; he likes to change them as often as he would change a poultice. There is no alteration in his moral character, no bad disposition manifested—he continues to feel the same love for his wife and child, although their occasional maladies appear to him trifles compared with his own; he cares for the maintenance of his family, and attends to his usual occupation, although his morbid sensations taint his every thought.

This condition either continues isolated, or it passes into another, which it is of extreme importance to appreciate well. Structural changes supervene in those organs which have hitherto been the stage upon which so many sensations, determined or increased by the patient's attention, have appeared. Thus a new period of the disease commences. The digestive organs, the liver, the stomach, the spleen, and intestinal canal, most frequently become the seat of the affection. Tumefaction or induration of the organs may be recognised by palpation and percussion. Hypertrophy and dilatation attack the heart, tubercle is deposited in the lungs. The organs of sense and the brain are less frequently affected. The constitutional symptoms correspond to the local malady. The complexion alters, nutrition becomes impaired, and hectic follows, but through the chaos of symptoms the red line of hypochondriasis may be traced; the sensations that are really present are increased, and new ones are generated by the power of the imagination. Thus we see a man with a jaundiced complexion, and a tumefaction of the right hypochondrium, which causes teasing and oppressive sensations, after meeting with an amaurotic person, himself troubled with abnormal appearances in his eye, and the fear of becoming blind.

The supervention of material changes in parts, the sensitive nerves of which had been mainly called into play in this disease, is a point of physiological consequence, and is allied to similar phenomena, occurring in the healthy state. It is well known, that a longing for food causes a copious discharge of saliva, emotion induces a flow of tears, libidinous thoughts give rise to erections and seminal discharges, immoral suggestions call forth blushes.[1] If we imagine such operations to assume a permanent character, and to become associated with a depressed state of the mind, which powerfully influences the nutritive processes, the supervention of a trophoneurosis no longer presents anything to be surprised at; the more so as derangement of vegetative processes is so often observed to accompany affections of the sensitive nerves.

Causes.—Hypochondriasis cannot be developed unless there be a morbid tendency in the individual to dwell upon his own sensations. Childhood ought *à priori* to be exempt from it, and so it is. A certain intellectual maturity, a capability of independent thought, is necessary to its production; the predisposition to the affection therefore prevails from puberty to old age. For the same reason, the female sex is not prone to hypochondriasis, for although the female possesses a great capability of receiving impressions, she is but little able to direct them by an effort of the will. The influence of climate has not been determined, but it appears that a temperate climate, damp and cool countries, such as the north-west region of Europe, favour the affection more than the south. An indolent, quiet, sedentary mode of life predisposes, and the more so if it has been preceded by great activity. Professional men and seamen are prone to it. Dangerous epidemics act as exciting causes. At the time when Asiatic cholera prevailed, hypochondriasis was almost epidemic. Inoculation or the suspicion of poisoning, syphiliphobia, the fear of mercury, or hydrophobia, may act in this way. Thus Chomel relates the case of a physician at Lyons, who, in the year 1817, had assisted in the dissection of several hydrophobic patients, and was seized with the conviction that he had been inoculated with the virus. He lost his appetite and was sleepless; when he attempted to drink, he was seized with choking and spasm of the pharynx; for three days he wandered about the streets in a state of despair, till at last his friends succeeded in convincing him that his malady had its foundation in his mind.[1] We must also mention the reading of medical books as a frequent cause of hypochondriasis; it is much encouraged by the numerous popular medical works now published, and by the homœopathic, hydropathic, and other pathic trashes that are now in vogue. The study of medicine is also adapted to produce the disease in subjects at all predisposed to it, and the hypochondriasis of students may serve as a mirror of the prevailing direction of our science. While a few decennia ago diseases of the heart were the terror of the hypochondriac, he has lately devoted his attention more to nervous diseases. It cannot be denied that hypochondriasis may be communicated; it is not only tedious to live with a person of this description, but it may become a source of danger. The healthy individual's attention is directed more to himself, and the hypochondriac, as Dubois[2] justly remarks, does not institute comparisons between his own sensations and those of others, for the purpose of calming his own apprehensions, but in order to excite similar anxiety and distress in others. Lastly, debilitating influences, by discharges, especially of semen, errors in diet, an abuse of medicines, suppressed arthritis, hæmorrhoids and oxaluria, may give rise to hypochondriac affections.

---

[1] My friend Professor Dieffenbach informed me, that he had a short time previously examined a small tumour of the pudenda of a lady, and that he observed the labia and the entrance to the vagina to be suddenly suffused like the cheeks.

[The point of this remark is rather etymological than medical, but could not be rendered in English; it would take up more space to explain it than it deserves, we therefore refer the curious reader to the original. We may, however, add, that it turns upon the German word for a blush: Schamröthe.—Ed.]

Nosology and diagnosis.—A great error prevails in the ordinary interpretation of the malady, from a misapprehension of the relation existing between the intellect and nutrition. The older physicians distinguished between hypochondria cum materia and hypochondria sine materia, a distinction which is still admitted. The former is considered to depend upon somatic changes, and especially upon disturbances in the organs of digestion and the abdominal circulation, while the latter is stated to be an independent mental affection. No great acumen is required to see the mistake here committed; it results from the history of the disease having been severed, and the successive stages having been treated as distinct conditions. The fundamental trait of hypochondriasis consists in the fact, that the patient's mind moulds itself to corporeal requirements, not in harmony with the ordinary constitution of the individual.[1] From the commencement, vegetative disturbances accompany the derangements of sensation; in proof of this we may mention the various secretions in the stomach, inducing flatulence and pyrosis, which manifest themselves by feelings of oppression and repletion. But the latter symptoms attract so much attention, as to obscure the former altogether, and thus the doctrine of hypochondriasis sine materia is established. When in the course and development of the affection, the organic changes become more prominent, and are rendered visible and palpable, the term hypochondria cum materia is applied. I am not disposed to deny the influence exerted by derangement in the organs of digestion, in causing hypochondriasis, although it is often a mere assumption; but this derangement does not constitute hypochondriasis, even if accompanied by ever such unpleasant sensations and distressing feelings. Hypochondriasis can only be said to exist, if the mind creates new sensations, which, in their turn, give rise to nutritive derangements. Those authors who have adopted the doctrine of material hypochondriasis, have gone so far as to subdivide the subject according to the material agent supposed to be involved, and have attributed distinct influences to black bile and to infarctions. I avoid going more into the details of the subject as too barren.

---

[1] Dubois; Ueber das Wesen und die gründliche Heilung der Hypochondrie und Hysterie. Edited, with an Introduction, by Idler; Berlin, 1840, S. 175.

[2] Loc. cit., p. 110.

Diagnostic errors are frequent from psychical hyperæsthesia being confounded with melancholia and hysteria. The characteristic peculiar to the former, as to insanity generally, consists in an alienation of the feeling of identity and consciousness as regards sensations and impressions, and this in melancholia is combined with a tendency to self-negation (negirendem Affect). In hypochondriasis, on the contrary, the egotistic principle is exalted, and in no ways estranged to some other sensation or impression, so as to render this an apparent reality in contradistinction to the essential and true reality. The difference is clearly expressed in all the patient's relations, not excepting his relation to his physician. The hypochondriac looks upon his physician, however often he changes his medical attendant, as his guardian and saviour; while the person labouring under melancholia, treats him as if he were a hostile or ignorant individual, and constantly tries to avoid him.

---

[1] [We have thought it right to attempt a translation of this passage, as containing a quintessential view of our author concerning hypochondriasis, but we are bound to confess our inability to comprehend his real meaning.—ED.]

Hysteria, which some have been tempted to treat as synonymous in females with hypochondriasis in men, presents such distinct characters that I should feel inclined to designate it the only contrast of hypochondriasis. Its chief feature is the preponderance of the reflex actions and sympathetic sensations excited by a definite centre, over the movements and sensation dependent upon impressions. Want of resolution is the characteristic of hysteria; the morale of the patient succumbs, and is under the dominion of the reflex actions. In hypochondriasis the mind is productive, it creates corporeal sensations and changes; the imagination clings to its own productions, and attaches itself to a given group of sensory nerves; whilst sympathetic sensations that fly from one nerve to another, belong to the characteristic symptoms of hysteria.

Course and termination.—Hypochondriasis runs an indolent, chronic course, except when it supervenes at the time of the prevalence of pestilences, or when it has been caused by the bite of animals. The prognosis must depend upon the stage of the disease. So long as no permanent organic lesions have taken place life is not endangered, but it is a difficult matter to establish a cure. When the former are present, their site and degree must determine the proximity or remoteness of the fatal issue. At times a low nervous fever, or tabes nervosa, closes the life of an hypochondriac. Metastases into other diseases occur, in which case we generally meet with diseases of the circulating system, such as hæmatemesis, hæmorrhoids, melæna, and of the organs secreting mucus; it may also pass into arthritis, in which case the hypochondriasis may be superseded or entirely removed. It is rare to find it terminating in cerebral lesions, insanity, apoplectic and paralytic states, and amaurosis.

One of the most arduous matters the physician has to deal with, is the *treatment* of hypochondriasis; it is easy to devise a plan, but difficult to carry it out, and it fails more frequently from want of perseverance on the part of the medical man than of the patient.

First of all we must guard against forfeiting the confidence of the sufferer by the unnecessary and unmeaning assurance that his troubles are based in his imagination only. The sensations of the patient are imaginary, but he transfers them from the mind to his body. In perception it makes no difference whether the irritation takes place at the central or peripheral termination of the fibre, and whether it is induced by directing the attention to it or by a mechanical, chemical, or organic cause. The physician should always be able to appreciate his patient's feelings, and show that he is acquainted with them, without either ridiculing and blaming him, or offering him flattery and sympathising verbosity. The friends of the patient should also be properly instructed how to behave, for they are not unfrequently at fault when the treatment fails. Unregulated and exaggerated sympathy is as injurious as cold unamiable reasoning.

There is another warning which is equally important; we must avoid putting ourselves forward as violent reformers. The patient has become the slave of his sensations, and is morbidly sensitive to every trifle that affects his weal or woe, and it cannot be expected that he should sever himself at once from what he looks upon as dearly bought experience.

The next point demanding attention in the treatment is the stage at which the hypochondriasis is brought before us; we must determine whether it is simply hyperæsthesia, or whether an advanced trophoneurosis has already been developed. The object of the psychical treatment must be to take off the patient's attention from the sensations, and to direct it to intellectual and physical activity. The rank and education of the patient must determine our choice of the means to be adopted. Thus the luxurious lounger should be recommended to take an active part in politics, in parish matters, or in attending to the poor; the student of metaphysics should direct his attention to the study of the natural sciences, or of astronomy. It is futile to require the entire abandonment of a business or profession; this may be recommended in books, but is impracticable in reality, and would be useless even if it were feasible; for a continued attention to impressions might be followed by insanity. The best means of giving the patient a physical impulse, is to induce him to acquire some mechanical accomplishment. Billiards, fencing, gymnastics, playing upon some musical instrument, afford amusement, and may be adopted according to the taste of the individual. But however well the selection may be made, the bodily regimen must not be neglected; in hypochondriasis, in which the mind seems, as it were, absorbed into the body, the body deserves full attention. An alternation of rest and activity is demanded, and even the species of rest and activity should be varied. Pedestrian tours, and sojourning in beautiful mountain scenery, riding, swimming, driving, sailing, shooting, are appropriate means of diverting the patient. It is desirable that the periods of sleeping and waking should be properly divided; that the former should not be too prolonged, and the bedroom cool. The diet must be of a simple character. Generally speaking coffee and tea are objectionable; for the former we may substitute cocoa or burnt rye. As beverages, wine and water, and a light, well-fermented malt liquor, may be recommended. Flatulent articles of diet, and suppers are to be avoided, while the evacuations are effectually promoted by the use of cold water enemata.[1] We must not overlook the question of sexual intercourse; the hypochondriac is inclined to over-indulgence in this point, and requires to be cautiously warned. There is a species of hypochondriasis, however, in which I advise sexual indulgence; it is that which depends upon a conviction of impotency, and with which I have seen young men afflicted who were on the eve of marriage. In such cases I prescribe, *pro forma*, a powder containing a few grains of lignum santali and sugar to be taken for a week or more, and advise that the attempt be then repeated; I have rarely heard that my remedy failed. Frequent seminal discharges, which often act as an exciting cause of the malady, must be combated by cold sponging of the perinæum and the neck, by hard mattresses, and the avoidance of much drink, bread, and the like at supper. Spermatorrhœa, to which not unfrequently hypochondriasis is to be attributed, requires special attention; and if all other remedies fail we must have recourse to cauterisation of the urethra, which has a moral as well as a physical effect, by withdrawing the patient's attention from his malady.

---

[1] The following anecdote, told of the 'spirituel' Doctor Marcus Herz, illustrates how we may occasionally relieve the painful anxiety of an hypochondriac. The doctor had advised a patient of this description to drink chocolade instead of coffee, to promote his daily evacuation, and to take it between two glasses of cold water which he has been in the habit of drinking. This system agreed well with him. One morning Dr. Herz was summoned hastily. He found the patient in alarm, as he had on that occasion forgotten his first glass of water. Allow me to recommend you, rejoined the doctor with affected seriousness, to take an enema of cold water; you will then put the chocolade in the middle. The patient's fears were calmed, and he could not find words enough to praise the doctor's ingenuity.

In the *medicinal* treatment of the first stage of hypochondriasis we must avoid everything that is unnecessary. This rule affords the advantage that the resources are not too soon exhausted; an event which the patient speedily perceives and punishes by a withdrawal of his confidence. The therapeutic treatment must be adopted with a view to two points. In the first instance we must remove the functional derangements of nutrition which supervene with the sensations, and calm the sensations themselves if they become too vivid; in the second we have to attack the organs themselves, in order to produce a change in the system and thus to withdraw the mind from its attention to the sensory impressions. The former is commonly considered a palliative, the latter a radical proceeding. The following functional disturbances, which accompany the sensations, deserve especial attention. 1. Flatulence. The first request of the hypochondriac is to supply him with carminatives; the more powerfully explosive the remedy, the more rapidly his confidence is secured. Besides the usual remedies, (mistura oleo-balsamica, oleum carui, æther, asafœtida,) cold is very effectual, in the shape of cold water with a few drops of acetic ether, as confectioner's ice or ice pills. 2. Abnormal secretion of hydrochloric acid in the stomach, pyrosis, acid eructations. After magnesia usta and liquor ammoniæ, we can advise bitters, as quassia and trifolium, but especially fresh ox gall combined with aqua menthæ pip. 3. Obstinate constipation, the difficulty of finding mild laxatives that have a permanent action, is very great. The most appropriate is the solamen hypochondriacorum Kleinii;[1] and if there is no tendency to piles or other hæmorrhages, aloes by itself, or in combination with other remedies, thus

---

[1] [The following is Klein's recipe:—
℞. Sulphur. Precipit., ℈ij;
Rad. Rhei, ʒj;
Cort. Aurant.; Magn. Carb., āā, ʒjss;
Potass. Tart.; Elœosacch. fœnic., āā, ʒiij.
M. S. ter die cochleare minus sumend.—Ed.]

℞. Elect. Lenit., ℥j;
Elixir. Proprietatis Paracelsi,[1] ʒj.
M. Sumat ʒj—ʒij, sub nocte;

or in Heim's formula:

℞. Ext. Aloës c. Acid. Sulph. corr., ʒj;
Syr. Balsam., ℥j.
M. Sumat cochlear, or minus.

Colocynth is a good remedy in doses of from a quarter to one third of a grain.

When it is desirable to calm troublesome sensations, soporifics must be avoided; opium generally disagrees with hypochondriacs. When there is too much anxiety and palpitation, I have often seen instantaneous relief following the exhibition of from six to eight drops of tincture of digitalis; for vertigo and hyperæsthesia of the special senses, the acids, elixir acidum Halleri, the elixir vitrioli Mynsichti,[2] in combination with bitters, are appropriate.

The radical treatment must have reference to the constitution of the patient, the condition of his vascular system, the causes that have preceded the indolent or irritative debility; and thus attempt to change or repair the physical state of the individual. There is one class of remedial agents, which unites all the points essential to the treatment of an hypochondriac, affecting his mental faculties, his regimen, and including medicinal agents, viz., the medicinal waters. It is necessary to select the place to be visited, conscientiously according to the requirements of each case. If irritative debility prevails, Ems is indicated; if the constitution is torpid, Gastein, chloride of sodium baths, and the seaside should be recommended. If exhausting discharges have preceded, Driburg, Franzensbad, Spa, and Pyrmont are suitable; if the activity of the intestinal glands is impaired, and arthritis is lying dormant, Carlsbad and Marienbad should be chosen. After going carefully through a course of waters and bathing, a journey should be undertaken. If the circumstances of the patient do not allow of the adoption of a plan like this, the artificial mineral waters may be substituted with advantage. The drugs that have acquired the greatest reputation are the so-called solvents and laxatives, but their employment has probably been so generally sanctioned without considering that their effect must rather be to afford temporary relief only, than to obtain a permanent cure. They are very appropriate if the patient be plethoric, and have a tendency to hepatic derangement; we may then prescribe tamarind whey, a grape cure, the recent juices of herbs, with acetate or bitartrate of potass, and even Kempf's enemata,[1] due regard being had to the special demands of the case. Under opposite circumstances, however, these remedies, though they afford some relief when contrasted with others, produce no permanent benefit. We may then have recourse to tonics, among which I prefer the preparations of iron. At the same time we must avoid carrying this remedy too far, as it will, in that case, increase the sufferings of the patient. The most appropriate form in which it may be given is the mineral water of Spa, taken in doses of from one to two wine-glassfuls the first thing in the morning; it may be continued for months or years. Taken in these moderate doses it rarely arrests the action of the bowels; but where it is the case, we must aid them with Stahl's aperient pills[2] and similar remedies. The ethereal tinctures of iron rarely agree, but the tincture of muriate of iron answers as well. Besides the use of iron, we have found a continued and regular employment of a bitter tonic beneficial, such as an infusion of herba trifolii fibr. or quassia taken morning and afternoon, in doses of a teacupful. I have obtained no results from the use of the nervine remedies, as valerian; &c. these and similar medicines may frequently be tolerated, and this circumstance is differently interpreted. There is a simple and powerful agent, cold, which even in the fashionable exaggeration of the water cure exhibits very marked results.

---

[1] [A compound of Aloes and Myrrh., āā, 4;
Saffron, 2; Dilute Sulph. Acid., 4;
Spirits of Wine, 55.
Dose: A teaspoonful, frequently repeated.—Ed.]

[2] [A compound of 1 part of Concentrated Sulphuric Acid to 24 of Aromatic Tincture. Dose from 20 to 30 drops.—Ed.]

---

[1] [The enema viscerale Kempfii contains Valerian and several bitter and aromatic ingredients.—Ed.]

[2] [Stahl's aperient pills:—

℞. Ferri Pulverati, ℈ss;
Pulv. Aloës, ℈ij;
Extr. Colocynth., ℈j;
Mucil. Mimos., q. s.
Ut fiant pilulæ, xl.—Ed.]

It happens very often that hypochondriacal patients consult us after they have gone through several systems of treatment, and have consumed a whole shopful of medicines, the recipes for which they present for examination in a roll of papers. In these cases, contrast is the most effectual; the patient may be allowed rest while we order some trifling placebo for his satisfaction, a proceeding which has been long known, but which in modern times has gained notoriety by being decorated with the fool's cap of homœopathy. In the second stage of hypochondriasis we must continue the dietetic treatment, regulated according to the strength of the patient; the other indications must depend upon the nature and seat of the organic affection.

CHAPTER XVIII.

ANÆSTHESIA.

ANÆSTHESIA implies a diminution or loss of the energy of a sensory nerve from its excitability or condensing power being reduced or destroyed.

It is thus distinguished as a disease from the state in which the sensibility has not been called into play or is undeveloped, as well as from that in which the activity of the nerve and sensation are temporarily suspended. The optic nerve may serve as an example: in strabismus its functions are not exercised; in cataract and glaucoma it is prevented reacting upon the application of external stimuli; in amaurosis it is extinct, and cannot be called into play either by external or internal stimulation. These different conditions have not, as yet, been separated from one another, as they deserve to be, although in an anthropological point of view, the perfection assumed to exist in the nervous apparatus, appears to be a subject of profound interest, and in pathology the distinction between undeveloped and impeded nervous functions from such as are incapable of being excited is very important. I shall have occasion frequently to return to this subject, in speaking of the neurosis of motility and of logoneuroses.

It is of no less importance to be well acquainted with the normal condition of the sensory functions, in order that we may be able to form a correct judgment as to their diminutions. Professor E. H. Weber[1] has given excellent directions for this purpose, in reference to the sense of touch, and the sensation of warmth. His investigations, which may serve medical men as a pattern for observation, prove that the consciousness of the distance between two points of a pair of compasses placed upon the skin, varies very much at different parts of the surface. Thus to mention the extremes, we find that at the volar surface of the last phalanx of the finger, two impressions are received by the two points of the compasses when separated one line; at the tip of the tongue the distance need only be half a line; while in the middle of the thigh, a distance of thirty lines is required for the same purpose. The hairy scalp is the dullest part about the head, though more sensitive than the neck; in the face the acuteness of sensation diminishes with the distance from the mouth and the mesial line. The chin and the external surface of the lip are distinguished by their delicacy of touch. The dorsal surface of the hand and the foot is much duller than the volar and plantar surfaces. In the same way the acuteness of taste varies according to the different parts of the tongue.[1]

---

[1] De pulsu, resorptione, auditu et tactu, annotationes anatomicæ et physiologicæ; Lipsiæ, 1834.

The capability of appreciating temperature also varies in health. One of the most remarkable instances of this is, that the majority of people receive an impression of greater warmth or cold from bodies touched with the left than with the right hand. The greater the surface of the skin, which comes into contact with the warm body, the more warmth is abstracted and the hotter the latter appears. This may be easily illustrated by dipping the entire hand into one vessel, and into another only one finger, the temperature of the water in both instances being the same. Even if the water into which the right hand is immersed is raised one or two degrees, the water will appear warmer to the left hand.[2] The different conducting power of bodies for physical warmth also comes into consideration; the same thermometric temperature operates more powerfully, and is felt warmer, if it is conveyed by water than by air. Cold water also appears colder than air of the same temperature, because the water abstracts warmth more rapidly from our body.[3] There are differences in the acuteness of the tactile sensation of the skin, which depend upon age. I have frequently seen old men, who exhibited no feeling, or but very trifling signs of sensation, when their faces were pricked. All these points deserve attention; and in symmetrical organs, a comparison of the two is necessary, in order to form an accurate opinion about Anæsthesia.

---

[1] See the Chapter on Ageustia.

[2] Weber; loc. cit., p. 119.

[3] Müller; Elements of Physiology, translated by Dr. Baly, vol. ii, p. 1328.

Anæsthesia manifests itself in different ways, according to the specific functions of the sensory nerve affected. The division of the subject, which is identical with that of hyperæsthesia, is determined by this relation. The laws of isolated conduction and of eccentric action, must be made the foundation for our diagnosis. By the latter we are enabled to explain a phenomenon which cannot be interpreted in any other way,—it is the occurrence of activity in a nerve which has lost the power of conducting sensations; when met with in a cutaneous nerve of sensation, it is termed *anæsthesia dolorosa*. The sensitive fibre is, as we have had occasion to show in the introduction, capable of being excited by an irritant, throughout its entire length, from its periphery to its central termination; but at whatever part the irritation is applied, the impression is referred to the peripheral end, as distinctly shown in the case of limbs that have been amputated, and have therefore ceased to have any relation to the individual. If there is anything to prevent the conduction of sensation, as a tumour seated in the nerve, the distal end of the nerve will be unexcitable, while its central end will be capable of receiving impressions, according to the well-known law of centripetal action. Whatever may be the source of irritation operating on the cerebral side of the tumour, whether the blood, the process of inflammation, or that of softening, the sensation will be referred to the peripheral terminations, though these are actually anæsthetic. In the cutaneous nerves this sensation frequently has the character of formication.

The mutual relations existing between nerves endowed with different functions, attract our attention in anæsthesia as well as in hyperæsthesia; in fact, they become the more interesting, as the negative condition causes most of the phenomena to appear with sharper outlines.

1. *There is an indissoluble connection between the nerves of sensation and the nerves of special sense.*—When the lingual branch of the fifth pair is affected with anæsthesia, the sense of taste is unimpaired on the paralysed side of the tongue. Magendie asserts, that in his vivisections he found that division of the fifth pair within the cranium caused diminution and loss of the optical and acoustic functions. Amaurosis is commonly associated with anæsthesia of the ciliary nerves, so that the eye

becomes insusceptible to the irritant influence of the sunbeams; in the same way anæsthesia of the meatus auditorius is conjoined with deafness.

2. *There is a manifest connection between the nerves of sensation and motion.*—Whoever has seen the twitch applied to a horse, has had the best opportunity of convincing himself of this relation; in order to secure immobility of the animal during operations or experiments, sensitive parts, such as the upper lip or the nose, are forcibly compressed, and the most violent movements cease at once. Reflex movements are peculiarly liable to be interrupted by breaking the conducting power of the nerves, and anæsthesia affords a means of clearly distinguishing the movements resulting from reflex action or from mental impulse. I have a patient suffering from anæsthesia of the left trigeminus, in whom rough handling, and even pricking of the bulb of the eye, does not cause winking, but who is able to close her eyes firmly when I ask her to do so. When the anæsthesia affects the vagus, there is no cough. It ought not to be overlooked, that other sensory nerves may conduct the irritation originating the reflex action.

3. *The relation existing between nerves of sensation and of nutrition is frequently manifested in anæsthesia.*—In the first place, the protection afforded to the surface by cutaneous sensibility is lost, and, in consequence, the vessels, *e. g.* of the eye, are permanently exposed to noxious influences and excoriations, and ulcers may arise from continued pressure; but a more immediate relation is exhibited by the retardation and disturbance of the circulation by the exudations of a serous, albuminous, or sanguineous character, and lastly, by defective nutrition. Illustrative instances of this occur in the following descriptions of the varieties of anæsthesia. Recent investigations and experiments have paved the way to a physiological interpretation of the phenomena. It affords me pleasure to refer to the results of a series of accurate experiments instituted by my talented pupil, Dr. Axmann.[1] The division of cerebro-spinal nerves at those points of their course, where new elements join, that originate in spinal and sympathetic ganglia, has demonstrated the influence that these fibres exert upon

---

[1] De Gangliorum Systematis Structura Penitiori ejusque Functionibus. — Diss. Inaug.; Berolin. 1847.

[illegible] desquamation of the
[illegible] the tissues, especially of
[illegible] and œdema. If the
[illegible] at which the fibres of
[illegible] other words, sympathetic
[illegible] find, in addition to the
[illegible] in the circulation, which
[illegible] of the face [illegible]
[illegible] irregular: the [illegible] are
[illegible] and in [illegible]
[illegible] hours later the [illegible]
[illegible] hours after that [illegible] again [illegible]
[illegible] the vessels of the posterior
[illegible] capillaries, as if a most
[illegible] Dr. Axmann has inge-
[illegible] experiments, by selecting
[illegible] nerves of the two sides of the
[illegible] difference in the symptoms

[illegible] of the nervous system
[illegible] the two species of per
[illegible] conscious through th
[illegible] of which we ar
[illegible] spinal cord (spinal)
[illegible] which the sensor
[illegible] point, while i
[illegible] manifested b

this we meet with in epileptic and other diseased conditions accompanied by unconsciousness.

The great discovery of the effects of the inhalation of ether and chloroform, which affords mankind and the brute creation the merciful dispensation from pain during operative proceedings, has produced valuable results with regard to the study of anæsthesia; it has served to place some of the relations first described in a more definite light. We now possess an agent, which, by being directly applied to an exposed nerve, as well as by inhalation or by injection into the rectum, is at all times capable of arresting sensibility in the peripheral and central nervous apparatus, provided the saturation be complete. All those tracts which previous experiments upon living animals had proved to be destined for the conduction of sensibility, lose, during the continuance of the narcotic effects of the inhalation, every susceptibility for irritation; they are the fibres of those spinal nerves that are provided with spinal ganglia, and of the fifth pair, the posterior division of the spinal cord and the medulla oblongata, and the inferior layers of the pons Varolii and the corpora quadrigemina.[1] Nor is the influence confined to conscious sensibility, but it affects also that range of actions of which we are unconscious, and is classed among the category of reflex phenomena; this is evidenced by the absence of blinking when the conjunctiva is irritated, and by the non-occurrence of deglutition when the pharynx is irritated. Conduction takes place indolently in the cerebro-spinal system, and is apparently at a stand still, as the relaxation of the muscles, which so much facilitates the reduction of dislocations, seems to prove; but it is by no means totally suspended; it continues to be subject to the will, and whilst mechanical and chemical irritants are able to produce but a trifling reaction, and to give rise to a gentle tremor, the electric shock exerts its full power. In the sympathic system the motor activity continues energetic, during the influence of stimuli; of this we have a demonstration in the contractions of the heart, in the peristaltic action of the intestines, and in the throes of the etherised parturient female. The respiratory movements, the stimulus for which is kept up by the medulla oblongata, continues uninterrupted. The energies of the brain and the nerves of special sense, occupy a different relation to anæsthesia. During the condition produced by anæsthetic agents, consciousness and the activity of the senses are generally in abeyance, and there may be utter vacuity, or there are dreams of a pleasing or even an ecstatic character. Not unfrequently, especially if the inhalation be imperfectly conducted, mere intoxication without anæsthesia is produced; the pain may then be felt, as shown by the groaning and screaming, and occasionally, by the violent movements of the patient, but he is not distinctly conscious of them, nor does he remember them.

---

[1] See Flourens, in Comptes rendus, February, 1847; and Longet, Expériences relatives aux effets de l'Inhalation de l'Ether Sulfurique sur le Système Nerveux; Paris, 1847, p. 8.

There are several other points of considerable physiological value in the consideration of anæsthesia. Anæsthesia affords irrefragable proof that sensitive nerves never act vicariously for one another; this fact manifestly controverts the assertions to the contrary, which are so complacently put forth by the soi-disant animal-magnetisers.

In our remarks on hyperæsthesia we have mentioned that in health, sensation continues even during the time that the sensory nerve is not irritated, because it continues in a state of permanent activity without any impulse beyond that constantly exerted upon it by the living interchange of the different constituents of the organism. In anæsthesia consciousness perceives and appreciates the negative state; thus, in the cutaneous surface, we have a sensation of numbness or deadness, which is distinct from the feeling of rest; its manifestations vary according to the peculiarity of the nerve,—in the optic nerve it shows itself as an impression of darkness, in the acoustic of silence, and so on; the manifestation itself requires the continuance of a certain, though a very low, degree of activity. If the irritability and conductility be lost, the sense of rest ceases, and this characteristic may be employed to distinguish the inexcitability of the sensory nerve from the mere temporary cessation of its activity. The sense of darkness in cataract patients differs materially from the spot occupying the field of vision of an amaurotic individual. (See the Chapter on Anæsthesia Optica.)

If we turn from these physiological considerations to the pathological view of anæsthesia, we observe, with regret, that it is one of those doctrines that have been hitherto much neglected, and therefore is full of defects and imperfections. We merely offer fragmentary information in the following pages, and look to future researches for greater completeness and a more comprehensive point of view.

The treatment cannot be otherwise than meagre under such circumstances. The assumption of nervous debility has often served the physician as an excuse for avoiding reflection, and has been an easy refuge, though the reliance upon nervine remedies has been often doomed to disappointment, for almost all these remedies only stimulate and increase the nervous excitement, without allaying the irritability and giving strength. The following remarks of Müller[1] are very applicable to the subject under consideration. He says: "The nervous force is only increased by the same processes by which it is constantly being reproduced, viz., the constant reproduction of all parts from the whole organism, and of the whole organism by assimilation. Gentle stimuli are, therefore, of advantage to a debilitated portion of the nervous system, not because they exalt the excitability, for they are unable to do it, but because an excited part makes a greater claim upon the restorative power of the whole, and is therefore sooner reproduced and restored."[2]

---

[1] Müller; Handbuch der Physiologie, vol. i, p. 633, 3d ed.; p. 608, 2d ed.

[2] [This passage is omitted in Dr. Baly's Translation.—Ed.]

CHAPTER XIX.

ANÆSTHESIA OF THE CUTANEOUS NERVES.[1]

The characteristic symptom of this variety of anæsthesia, is diminution or loss of the normal tactile sense of the skin, in its simple or modified condition.

A state of incomplete anæsthesia has recently been observed, which offers much interest; it is the continuance of tactile sensation combined with anæsthesia in regard to pain. In one of the last operations performed by my late friend Professor Dieffenbach, the extirpation of a nasal polypus, the patient, who was etherised, continued conscious; and in reply to my inquiries about the pain he was suffering, stated that he merely felt the dragging and tearing of the forceps as the moving about of a wooden rod in the nostrils. At the same time he held his head erect, and sat firmly on his chair. In his Treatise on Etherisation,[2] Dieffenbach alludes to this as a most striking phenomenon, that the patient should feel no pain, and yet feel the operation. Such insensibility to pain, with a continuance of the sense of touch, occurs in various diseases, but most frequently in lead poisoning, and not rarely in hysteria, but never in cases where the sense of touch is destroyed.[3]

In order to determine the existence and the extent of the cutaneous anæsthesia, it is not sufficient, as has been the prevailing custom, to rest satisfied with the statements of the patient, and with his vague accounts of numbness, deadness, &c.; the degrees and limits of the anæsthesia must be measured with the point of the needle. The examination must be conducted while the eyes of the patient are closed, both in order to be secure against simulation, as well in order to prevent the psychical impression caused by the sight of the instrument with which the pain is to be produced.

---

[1] Romberg; Ueber Anæsthesie, in Wochenschr. für die gesammte Heilkunde, 1839, Nos. 11, 19, and 20.

[2] Der Æther gegen den Schmerz, 1847, p. 61.

[3] See Beau, Recherches Cliniques sur l'Anesthésie, suivies de quelques considérations physiologiques sur la Sensibilité, in Arch. Gén. de Méd., Jan., 1848, pp. 1—24.

Cutaneous anæsthesia gives rise to a diminution or a loss of the sense of warmth and cold, as well as of tactile sensation. English physicians have published a few accurate observations on the change of the sense of temperature in anæsthesia. In one case in which anæsthesia had affected the feet half up the calves and the hands, the patient experienced no feeling of temperature when brought into contact with solid bodies, not even if ice was applied; water at every temperature appeared luke warm. Another patient, himself a physician, (Dr. Vieusseux, of Geneva,) whose right side was anæsthetic, called hot things that were applied to it cold, or lukewarm, and cold things hot. When lying in a cold bed, it seemed hot to the right side and cold to the left. In a hot bath the water appeared hot to the left side, and neither hot nor cold to the right. Very cold water produced a sense of warmth on the right side. If he touched a substance which was neither hard nor polished, such as the hand of a friend, he was unable to determine its temperature, and he was forced to call in the aid of the left hand.[1]

The nutritive functions are impaired in the parts affected with cutaneous anæsthesia.

The development of caloric is diminished. Ollivier gives the case of a man who, after a fall upon his back, suffered from anæsthesia of his right side, and retained paralysis of motion of the left side. Three months after the accident the temperature of the right side was 1½° Reaumur, (about 3½° F.,) lower than that of the left side.[2] Earle examined the temperature of the paralysed parts in a girl, in whom five years previously he had excised a portion of the ulnar nerve on account of obstinate neuralgia. The temperature of the room was 55° Fahr. The little finger was colder than the rest of the hand; at the dorsal surface of the base of the little finger the thermometer was 56° Fahr.; in the cleft between the ring finger and the little finger it was 57°; at the radial surface of the index 60°; and between the index and the thumb, and in the hollow of the hand, 62°. In another case, in which a fracture of the clavicle had induced complete paralysis of the left arm, the following determinations of temperature were obtained:

---

[1] Traité des Maladies de la moëlle épinière, 3d ed., vol. i, p. 509.

[2] See Marcet; History of a singular Nervous or Paralytic Affection, attended with anomalous Morbid Sensations, Med.-Chir. Trans., vol. ii, p. 247.—Yelloly; History of a Case of Anæsthesia, ibid., vol. iii, p. 90.—Earle; Cases and Observations illustrating the influence of the Nervous System in regulating Animal Heat, ibid., vol. vii, p. 173.

Paralytic Arm	Hand . . .	71° Fahr.	Healthy Arm	Hand . . .	92° Fahr.
	Arm . . .	80° „		Arm . . .	95° „
	Armpit . .	92° „		Armpit . .	96° „

Another phenomenon regarding the question of temperature, is characteristic of anæsthesia of the cutaneous nerves, and has not met with due attention hitherto; it is the inability of the affected part to preserve its own temperature in opposition to the temperature of the surrounding media. The equilibrium with the external temperature is so rapidly established, that degrees of heat or cold, which are well borne by healthy parts, are injurious to the anæsthetic regions. In the girl alluded to above, suffering from anæsthesia of the ulnar nerve, the occurrence of frosty weather always gave rise to blistering and ulceration of the little finger; the same took place if she washed the teacups in warm water when the weather was cold, though the temperature of the water was agreeable to the other parts of the hand. The patient with the fractured clavicle introduced his arm into warm malt, and held it there for half an hour, having previously ascertained, with the sound hand, that the temperature was agreeable. On withdrawing the former the whole hand was covered with a blister, and eschars had formed on the tips of the fingers. This hand was always disposed to be instantly affected by the temperature of the surrounding medium. Yelloly relates the same of his patient; for even while sitting before the fire, the knee of the affected side became vesicated, though the clothes were uninjured. Dieffenbach[1] has remarked the same tendency in portions of the face that had been replaced by plastic surgery. As soon as they fully recovered their tone and sensibility they were capable of enduring extreme cold, but large vesications formed on a young nose after a single walk in the open air. Nor is temperature the only agency the power of resisting which is destroyed by anæsthesia; every external influence, such as mechanical pressure, is met with a similar want of power; of this we have an evidence in decubitus. Thus bedsores of the sacrum are rapidly induced in injuries or diseases of the spinal cord accompanied by anæsthesia; in the same way as sloughs occur on the lower extremity of animals after division of the sciatic nerve.

---

[1] Chirurg. Erfahrungen, besonders über die Wiederherstellung zerstörter Theile des menschlichen Körpers nach neuen Methoden, vol. i, p. 188.

The circulation is more or less deranged in the small vessels; it is generally retarded, and thus the parts assume a livid hue. The fingers of a patient of mine who, in consequence of a cerebral affection, has been attacked by anæsthesia of both hands, are constantly, in hot weather and cold, of a bluish red colour. Extravasations of serum, albumen, and the colouring matter of the blood, are not unfrequent. Sir Benjamin Brodie adverts to two cases of division of the ulnar nerve by external injury; in one the little finger was cold, insensible, and covered with purple blotches; in the other, the finger every now and then assumed a purple hue; a large bladder then formed, followed by a superficial ulcer, which healed with the formation of a fresh cuticle.[1] Albuminous exudation and subsequent suppuration, hæmorrhage from the nostrils and the oral cavity, occur in anæsthesia resulting from disorganisation of the roots of the fifth pair and its ganglion. Anæsthesia is occasionally accompanied by œdema.

The horny tissues suffer most from the abnormal state of nutrition. There is increased branny or scaly desquamation of the epidermis, accompanied by absence of transpiration on the legs of paraplegic patients. The nails curve in, become rough and ragged, and fall off. Dr. Steinrück, after dividing the infra-orbital nerve in rabbits, observed the whiskers fall off. Sometimes the bones of parts that are subject to pressure become necrosed.

The following case presents several of the phenomena just adverted to, in a very marked degree.

A woman, 50 years of age, had for ten years suffered from violent pains in the right foot, chiefly confined to the vicinity of the outer ankle, the back of the foot, and the toes. At the outer and posterior side of the thigh, at about its middle, a tumour of above five inches in circumference was observed, which was also painful; it was tender to the touch and on pressure, which at the same time augmented the pain in the parts of the foot mentioned. In the course of time the pains increased in intensity, continuing day and night, so that the patient resolved upon following Professor Dieffenbach's advice, to have the tumour removed, which he had recognised as a neuroma.[1] I myself saw the patient a couple of weeks after the operation, in the month of April, 1836. There was complete anæsthesia in all those parts which are supplied by the peronæus and tibialis nerves, whereas the parts supplied from the sciatic above its division, and by the cutaneous branches of the crural nerve, preserved their sensibility. Thus we were able to determine the boundary of the sciatic and crural nerves on the dorsum of the foot accurately with a pin. In the vicinity of the inner malleolus the patient experienced vivid pain from the prick, for there was no interruption to the course of the saphenus internus nerve; at the middle of the dorsum and at the external malleolus, which are supplied by the cutaneous branches of the tibial and peroneal nerves, the insertion of the needle at any depth caused no sensation. The motility of the leg closely resembled the state of the extremity in animals

---

[1] Lectures illustrative of certain local Nervous Affections; London, 1837, p. 73.

---

[1] The following is the accurate analysis of the tumour made at the time by Dr. Remak:—

"It presented an oval shape of about five inches in its long diameter, and was closely invested by the tense and firm neurilemma, excepting at the points of exit of the nerve fibres. On one side, one could see faintly, through the neurilemma, the majority of the nervous fibres separated from one another by the tumour. On dividing the external neurilemmatous sheath, the nerve fibres which were externally uninjured, were entirely surrounded by a scirrhous mass; the tumour was invested by several membranous layers, which became coarser and more parenchymatous towards the interior, and among which a few isolated nerve fibres could be seen to pass. The tumour itself consisted of two portions separated by a layer of membrane; the smaller of these was of a globular form, and attached to the more oval, larger one, at its thickest extremity, and a little to one side. The majority of the nerve fibres occupied the upper layer of the larger portion, and only the few fibres passing through the membranes reached the smaller portion; but here they had entirely lost their neurilemma, so that the ultimate fibrils were exposed, and presented a greyish appearance. Both portions exhibited the structure peculiar to scirrhus, a light-coloured cortical and a grey medullary substance with white shining fibres. The larger one presented a cavity in its interior of spongy texture and traversed by fibrous trabeculæ, and filled with a yellowish-green serous fluid. The smaller one was solid throughout. The primitive fibrils of the nerves presented a peculiar disorganisation, such as is occasionally found in nerves that are partially destroyed, and which was also painful; it was tender to the touch and on pressure, which at the same time augmented the pain in the parts of the foot mentioned. In the course of time the pains increased in intensity, continuing day and night, so that the patient resolved upon following Professor Dieffenbach's advice, to have the tumour removed, which he had recognised as a neuroma.[1] I myself saw the patient a couple of weeks after the operation, in the month of April, 1836. There was complete anæsthesia in all those parts which are supplied by the peronæus and tibialis nerves, whereas the parts supplied from the sciatic above its division, and by the cutaneous branches of the crural nerve, preserved their sensibility. Thus we were able to determine the boundary of the sciatic and crural nerves on the dorsum of the foot accurately with a pin. In the vicinity of the inner malleolus the patient experienced vivid pain from the prick, for there was no interruption to the course of the saphenus internus nerve; at the middle of the dorsum and at the external malleolus, which are supplied by the cutaneous branches of the tibial and peroneal nerves, the insertion of the needle at any depth caused no sensation. The motility of the leg closely resembled the state of the extremity in animals

---

[1] The following is the accurate analysis of the tumour made at the time by Dr. Remak.

"It presented an oval shape of about five inches in its long diameter, and was closely invested by the tense and firm neurilemma, excepting at the points of exit of the nerve fibres. On one side, one could see faintly, through the neurilemma, the majority of the nervous fibres separated from one another by the tumour. On dividing the external neurilemmatous sheath, the nerve fibres which were externally uninjured, were entirely surrounded by a scirrhous mass; the tumour was invested by several membranous layers, which became coarser and more parenchymatous towards the interior, and among which a few isolated nerve fibres could be seen to pass. The tumour itself consisted of two portions separated by a layer of membrane; the smaller of these was of a globular form, and attached to the more oval, larger one, at its thickest extremity, and a little to one side. The majority of the nerve fibres occupied the upper layer of the larger portion, and only the few fibres passing through the membrane reached the smaller portion; but here they had entirely lost their neurilemma, so that the ultimate fibrils were exposed, and presented a greyish appearance. Both portions exhibited the structure peculiar to scirrhus, a light coloured cortical and a grey medullary substance with white shining fibres. The larger one presented a cavity in its interior of spongy texture and traversed by fibrous trabeculæ, and filled with a yellowish green serous fluid. The smaller one was solid throughout. The primitive fibres of the nerves presented a peculiar disposition, such as is occasionally found in nerves that are partially destroyed, and after the division of the sciatic in the thigh. The muscles of the leg and foot only were paralysed, and the patient continued able to move the leg, as the muscles of the thigh were unaffected. Decubitus appeared early at the heel. The ulcerated part discharged a thin, sanious fluid, was painless, presented no inflammatory reaction, was pale and easily sphacelated; it resembled the wounds described by Schröder van der Kolk,[1] as occurring on the leg of a dog after the division of the sciatic and crural nerves. Soon after the nails exfoliated. Three years after I again saw the patient, who came to meet me without the assistance of crutches. She rested upon the external edge of the right foot, which thus presented the appearance of a varus; the inner edge being turned upwards, and the sole of the foot being directed inwards. In addition to the former ulceration on the heel, which still continued, a second one had formed at the external edge of the foot near the ankle, from which necrosed portions of bone, from time to time, exfoliated. The epidermis of the dorsum of the foot and of a portion of the leg constantly desquamated, and was discharged in scales like those of psoriasis. The colour of the skin in the dorsum of the foot was dark red and shining. It was remarkable that the temperature of the paralysed foot was higher than that of the

which in this case, as the preparation was fresh, might well be attributed to the long-continued mechanical influence exerted by the tumour. Almost all the medullary tubes presented the appearance of a series of funnels inserted into one another. The varicose tubes were unaffected. The common neurilemma consisted of cellular tissue and a few vessels. In the subsequent layers the vascular network was found to have increased, and in addition to the cellular tissue there was a peculiar variety of fibres; in the vicinity of the solid scirrhus there were round granular bodies, like those found in the grey substance of the brain, and caudate translucent bodies, resembling the corpuscles seen in the nerves of the embryo. The solid substance consisted of a considerable vascular network, the fibres mentioned, and an abundant quantity of the corpuscles spoken of, which, in the grey substance, entirely displaced the fibres, and were also found swimming about in the cavity.

"It follows that (excepting the neurilemma) the sheaths did not essentially differ from the scirrhous mass. The grey hue of the innermost layer resulted from the predominance of the granules and the comparative absence of fibres. The liquid might be merely the product of decomposition of the growing mass, proceeding from within outwards. A secreting serous surface, as seen in encysted tumours, was not to be found. The preparation just described has been placed in the Museum of the Berlin University."

[1] Observat. Anatom. Pathol., p. 14.

opposite extremity; it was 25° R. (88¼° F.,) at the outer ankle, and on the corresponding point of the healthy foot the thermometer showed 24° R. (86° F.) In the interval between the third and fourth toe of the paralysed foot the temperature was 24° R. (86° F.) at the same point of the healthy foot it was 23° R. (83¾° F.)[1] No emaciation had ensued. The anæsthesia continued in the same degree in which I had observed it during the first weeks after the removal of the neuroma. The patient's description of her painful sensations in the anæsthetic parts, given in reply to my questions, was interesting; they obeyed the law of eccentricity like the sensations occurring after amputations. An accidental pressure of the thigh, for instance, against the edge of a chair, caused a sense of numbness and formication in the toes and the foot. At the commencement there were frequent pains, which rarely occurred afterwards, though the patient seemed occasionally to feel her foot in walking.

In cutaneous anæsthesia, the patient, as we have seen in the case just related, frequently complains of numbness, pricking, and formication, and sometimes of vivid pains.

The symptoms are modified according as the anæsthesia is seated in the peripheral or the central organs of the nervous system. When due to a central affection, the anæsthesia is rarely confined to a few tracts, and it is accompanied by a derangement of motility. If it has a peripheral origin, nutrition is the more likely to become impaired, if the ganglionic system is implicated.

Of centric anæsthesia, and especially of that form which occurs as the main symptom in a species of lepra, the indigenous spedalskhed of Norway, we shall treat under the head of spinal anæsthesia. Peripheral cutaneous anæsthesia occurs most frequently by solution, in the continuity of nerves by external injury or surgical operations, by continued pressure exerted by neighbouring organs, (glands, uterus, intestines,) tumours, (of the neurilemma, of bones, vessels, tubercle or fungus,) boundary between the flap and the part from which it was removed, and on the bridge it is yet very trifling. Several months after the complete cicatrisation of the cut surfaces, a dull sensation is developed in the transplanted flap, commencing at the edges. The feeling of pain resulting from the prick of a pin is undefined and obtuse at the circumference, and as yet nothing is felt at a distance from the edges. The patient, however, forms a tolerably correct judgment as to the locality of the injury, though it is not as accurate as if applied to perfectly sound parts. We cannot call it anything but a pleasantry on the part of Lisfranc, when he states that a prick in the nose formed from the skin of the forehead, is referred by the patient to the forehead.[1] The tip of the new nose does not acquire perfect sensibility for a long time, often not for an entire year; and it is not until this is the case, that it resembles the surrounding skin in regard to its other functions. The nose then perspires, and if wounded, secretes a laudable pus, a circumstance from which we may conclude that perfect innervation is essential to the formation of pus.

---

[1] In a carefully observed case of anæsthesia of the fifth pair on the right side, described by Dr. Franz von Meyer (Jena, 1847,) in a dissertation, of which we shall have occasion to take further notice, the temperature of the anæsthetic side of the face was throughout from 1°—1¼° Reau. (2¼°—4° Fahr.) higher than that of the opposite side.

Dr. Steinrück has recently given a complete anatomical demonstration of the natural process of cure of traumatic anæsthesia cutanea, in his excellent dissertation.[2] By the aid of the microscope, he has not only succeeded in proving most positively, that a regeneration of the primitive fibrils of the nerves is effected, but he has also shown the transition of single fibrils from the fasciculi of the cicatrix in the fasciculi of the nerve itself.[3] In all cases but one, the conduction of sensation was restored, as the nervous fibres were replaced, but anæsthesia remained in those cases in which the cicatrix consisted of cellular tissue only.

Extravasations of an albuminous or other character, that have taken place at the base of the brain, or in the spinal cord, may be absorbed.

---

[1] Although Professor Dieffenbach had a fund of experience at his command, such as possessed by no other contemporary, Lisfranc's statement is applicable to some cases; I had occasion to verify it in a patient in whom Dr. Berend had formed a nose from a frontal flap. Six weeks after the operation, when the nose was pricked, while the patient closed his eyes, he repeatedly referred to his forehead as the seat of pain. No previous experiments had been made upon him, a circumstance which enhances the value of my observation.

[2] De Nervorum Regeneratione; Berolin. 1838.

[3] Loc. cit., tab. ii, figs. 5, 6, 7.

The period in which the conduction of sensation may be re-established after a peripheral injury cannot be absolutely fixed, it varies from four weeks to three or four years and more; in some cases it is never entirely recovered.

The *treatment* of anæsthesia cutanea has hitherto been superficial in the literal sense of the word. Inunctions and cataplasms are often lauded as curative agents where the result ought more justly to be attributed solely to the powers of nature. We may anticipate some advance to be made in future, as our knowledge of the seat and the causes of the diseases develope. We must direct our attention to the vascular system here as well as in hyperæsthesia, the more so if an inflammatory condition has preceded. In such a case the local abstraction of blood, especially by means of cupping, applied as closely as possible to the seat of the malady, is indicated. Various remedies may be employed in order to remove any source of compression; discutants are proper if we have to deal with enlarged glands, evacuants if we have to combat intestinal accumulations. When we have attended to the etiological indications, we are not to expect an immediate return of complete cutaneous sensibility; for that purpose a return of the irritability is necessary, and this may be promoted by stimulants and restorative treatment. Under this head we must first mention dry or moist friction; it should be carried in a centripetal direction, so as to correspond with that of sensory conduction. The application of heat is also valuable, by approximation to the fire, or the application of moxæ (not carried to such an extent as to induce suppuration) of steam, spirituous liquids, hot baths, the baths of Gastein, or animal baths.[1] The natural warmth of the body should be kept up and promoted by covering the parts with bad conductors of heat, as leather or plasters. We may try the application of fermenting substances, as malt or sour krout; nor are we to refuse the assistance of magnetism, electricity, or galvanism, (galvano-puncture,) and we may expect good effects from regularly applied vibrations or concussions of the affected part.

---

[1] [Animal baths consist in introducing diseased members into the bodies of animals recently killed, that still retain their warmth.—Ed.]

CHAPTER XX.

ANÆSTHESIA OF THE FIFTH PAIR.

Experiments.—Division of the fifth pair in a living animal is followed by insensibility of the face, of the eye, the nostrils, the cavity of the mouth and the tongue; and it will be partial or general according to whether separate branches or the entire trunk has been divided. Fodéra and Herbert Mayo were the first to make the section within the cranial cavity in 1822.

Division of the fifth pair within the cranial cavity produces, in addition to anæsthesia, phenomena of a different character in the range of nutrition, of motility, and the functions of the special senses.

The effect upon nutrition is most rapidly perceptible after division of the ganglion Casseri. It manifests itself most visibly in the eye, and has been described by Magendie,[1] and still more carefully by Valentin.[2] In the rabbit the following results are noticed: sixteen hours after the division or contusion of the fifth pair within the cranium, there is considerable injection of the surface of the eye, which is deprived of its sensibility. After twenty-four hours there is opacity of the cornea; after thirty-eight hours an exudation on the middle of the cornea shows itself. After sixty-two hours the centre of the cornea presents a milky opacity with intense congestion of the vessels of the iris and conjunctiva. After eighty hours we meet with a copious secretion of a viscid purulent fluid, which agglutinates the eyelids. After one hundred and four hours, the pus and the opacity of the cornea have increased so far as entirely to conceal the iris. One hundred and twenty-eight hours after the operation the blennorrhœa has ceased, an ulcer three lines in diameter has formed on the surface of the cornea and the anterior chamber is filled with white exudation matter. Twenty-four hours later the congestion is found to have continued, the ulcer is enlarged and covered with a dry yellowish crust. One hundred and seventy-six hours after the division there is considerable reddening of the conjunctiva and increase of the hypossion. After death the cornea is found staphylomatous, the anterior chamber filled with exudative matter, found under the microscope to contain granular and pus corpuscles, and the fibres of the cornea are opaque. The lens, the retina, and the other parts of the eye retain their normal condition. In dogs Magendie has observed, in addition to the above symptoms, rupture of the cornea, discharge of the fluids of the eye, and contraction of the bulb; the corresponding half of the tongue has become brown, fissured, and dry, and the gums are spongy and bleeding. The teeth become loose, and fall out, as do the whiskers. In animals that are tenacious of life, as the batrachian reptiles, the soft parts of the face become detached in gangrenous patches, as in spontaneous gangrene. After three or four weeks one half of the face only remains.

---

[1] De l'influence de la cinquième paire de Nerfs sur la Nutrition et les Fonctions de l'Œil, in Journ. de Physiol. expér. et Pathol., vol. iv, p. 176.

[2] De Functionibus Nervor. Cerebral., p. 157, not. v.

The movements of the face are arrested at the side of the face on which the trigeminus has been divided. We have already stated that the reflex actions are those which are mainly impaired. The pupil is immovable; in rabbits it is permanently contracted; in dogs it is dilated.[1]

Magendie states that the winking of the eyelids and the alternate dilatation and contraction of the ala nasi ceases. The tongue lies immovably between the teeth of the upper and lower jaw. The arrest of motion is still more marked when both trigemini have been divided. The animal waggles its dull head as if it were a foreign body, and its gait is tottering.

The sensual function of the organ is impaired as well as the motility, when there is anæsthesia of the nerves of sensation appertaining to the organs of sense. This derangement is most distinctly manifested in regard to taste, to which point I shall have occasion again to revert; next in the sense of smell, less in regard to sight, and least of all in hearing. Moreover the derangement of nutrition exerts an undeniable influence, especially in the eye, upon the diminution and loss

---

[1] Valentin, loc. cit., p. 23.

[illegible] There could be no doubt
[illegible] from the foramen of the
[illegible] the under lip had been
[illegible] under the teeth. In
[illegible] manner, was
[illegible] the under lip than by
[illegible] discovered it by not
[illegible] drinking. When
[illegible] be insensible
[illegible] Sir Charles
[illegible] the angle of the
[illegible] attached to the
[illegible] undoubtedly
[illegible] enters at the
[illegible]

[illegible] the facial
[illegible] the
[illegible] the fifth
[illegible] respective
[illegible] must be affected
[illegible]

[illegible] surface of the eyeball
[illegible] a patient to
[illegible] the left side of whose
[illegible] could be pressed and
[illegible] When the second
[illegible] functions, and
[illegible] external contact
[illegible] a pointed body, is
[illegible] cause no impression.
[illegible] A case of this kind
[illegible] a private house of
[illegible] in a hall, where the
[illegible] constant draught.
[illegible] violent pains in the
[illegible] supervened, and
[illegible] as an out-patient.
[illegible] the left trigeminus
[illegible] the left half of the
[illegible] as well as the mucous

membrane of the mouth, and the gums of this side were entirely anæsthetic. Deep punctures with needles, applied to these parts, were not felt at all, whilst if the skin, which is supplied by the first and third branches, was slightly pricked, the patient gave marked symptoms of sensibility.

The movements of the left side of the face could be executed, but they were in a measure limited, as appeared when the attempt at a snuffling movement of the alæ nasi was made. At the same time the patient complained of occasional lancinating pains in the anæsthetic side of the face. The eye often wept, the nostril was dry, and together with the gums of the affected side, presented a great tendency to hæmorrhage. The patient stated expressly that the anæsthetic cheek assumed a livid hue when exposed to the cold, and then contrasted strangely with the normal colour of the healthy cheek. It deserves to be mentioned that there was a tumefaction of the left os nasi, which was said to have shown itself coincidently with the violent pains of the left half of the face. The history of the case rendered it probable that the complaint took its origin in rheumatism. On this assumption the iodide of potassium was ordered in solution in doses of five grains four times a day; at the same time an ointment containing the same substance was rubbed into the anæsthetic parts. Three weeks from the commencement of treatment the lancinating pains in the anæsthetic side had disappeared; sensibility had returned in the skin of the nose and the cheek, and the upper lip was the only part in which any traces of anæsthesia remained. Treatment was continued, and these also ceased after a time.

When the conducting power of the third branch is impaired, the corresponding half of the tongue is found to have lost its sensibility. To avoid repetition the reader is referred to the cases detailed in the section treating of anæsthesia of the gustatory nerve.

c. When the entire sensory tract of the fifth nerve has lost its sensation, and there are at the same time derangements of the nutritive functions in the affected parts, the Casserian ganglion, or the nerve in its immediate vicinity, is the seat of the disease.

In addition to insensibility in the external and internal surfaces of the face, the following symptoms present themselves·

the eye inflames, suppurates, ulcerates, and becomes atrophied; the cavities of the nostrils and the mouth are reddened, there is hæmorrhage, and the gums are soddened.

Herbert Mayo was the first to communicate a case of this kind in his anatomical and physiological commentaries, published in 1822; he was followed by Serres,[1] who has described an instance of this important form of anæsthesia, and accompanied it by an account of the post-mortem appearances. It is as follows:

A man, æt. 26, who was subject to epileptic fits, suffered from chronic inflammation of the right eye. In December, 1823, an acute inflammation supervened, accompanied by œdema of the eyelids and opacity of the cornea. A seton was applied, in consequence of which the ophthalmia disappeared, but the cornea remained thickened and opaque throughout. In the following January and February the right eye was observed to be insensible to touch. In June the right nostril and the right half of the tongue were proved to be anæsthetic. Between the 15th and 20th of June, the gums of the right side inflamed, first in the upper jaw and then in the lower; a scorbutic condition was developed, which, in the month of August, extended to the left side, though in a lower degree. A careful examination now yielded the following results: if the right eye was rubbed with a feather the patient had no sensation, and did not even blink. The inner surface of the eyelids was equally insensible. When the left eye was thus treated, the usual reaction occurred. The right nostril was insensible to the application of a feather; spirits of ammonia only caused a trifling impression, though the application of the smelling bottle to the left nostril could scarcely be borne. The patient could not taste the disulphate of quinine when applied to the right side of the tongue, while he tasted its bitterness on the left side. The gums on the right side had become detached from the teeth, which were loosened. The post-mortem examination, which was made in the presence of Magendie and Georget, showed the ganglion Casseri of the right side to be diseased, of a greyish yellow colour, tumefied and reddened, and congested at the point at which the ophthalmic division passed off. The two divisions participated in this change of colour and structure, as far as their respective exits from the skull, the inferior maxillary branch being more affected than the superior. The lesser, motor portion of the fifth, was normal in its entire distribution.

---

[1] Magendie, Journal de Physiologie Expérimentale, V. 233. 1825.

Gama, in his Traité des plaies de tête et de l'Encéphalite (Paris, 1830, p. 173,) communicates a case of which the following is an abstract:

A military man, who was affected with paraplegia, had for about nine months complained of a gradual loss of sensation in the right half of his face, and of vision in the corresponding eye. He felt that he did not masticate equally well on both sides, and had adopted the habit of not carrying the food to the right side of the mouth. He often asked for an acid gargle in order to render the gums harder. The amaurotic eye did not differ much from the healthy organ in lustre or size. The pupil was rigid in the most powerful light. Handling the conjunctiva or the cornea conveyed no sensation to the patient. He felt no pain when the cheek, the forehead, or any part of the right half of the face, was pinched, but sensation was not utterly gone. He would remark that this side of the face was dead, but that he could distinguish between a mere touch and a pinch. The feather of a quill even could be introduced and twisted about in the right nostril without exciting any sensation. Smell and taste were unimpaired; the patient asserted that he perceived no difference between the two sides of the tongue. The sensibility of the tongue was unimpaired on both sides, whereas that of the oral mucous membrane, was totally destroyed on the right side. The muscles of mastication of the right side were paralysed. The mouth was drawn to the left side. After death the origin of the trigeminus was found to be yellow, softened, atrophic, and deprived of its white matter. The ganglion Casseri was much enlarged, and presented the appearance and consistency of bacon. The nerve fibres, which are generally traceable through the ganglion, were entirely fused with it. The first branch of the fifth and its ramifications were reddened, as if congested, and adhered closely to the tendinous sheath within the orbit. The inferior maxillary branch appeared normal after its issue from the maxillary foramen. The superior maxillary was most altered, being thickened, tough, and steatomatous like the

Dr. Rigler, the former assistant of Professor Jäger of Vienna, was appointed, in 1843, to superintend the first arrangements and the management of the Military Hospital at Constantinople, and has sent me an account of the malady of a Turkish officer, who, in consequence of a fall from his horse upon the left side of his head, had been deprived of his consciousness for several hours. The man was 28 years of age, of robust constitution, and unimpaired vigour. On recovering his consciousness after the fall, he complained of severe pain in the left half of his head, of photophobia, tinnitus aurium, and drowsiness. These symptoms continued for three months. The treatment was at first powerfully antiphlogistic, and was afterwards confined to the repeated application of leeches, blisters, and the internal administration of small doses of the tartrate of antimony. At the time when Dr. Rigler first saw the patient, he had been free from headache for two months; the conjunctiva of the left eye was of a dark, dusky red, œdematous, and invested with a thin secretion, which fretted the swollen edges of the lids; the lower half of the cornea was rendered opaque by an exudation between its laminæ, there was considerable mydriasis, and a capsulo-lenticular cataract; the functions of the retina were more impaired than is generally the case in such material changes in the eye, and the bulb felt very soft. The affected eye had formerly been as vigorous and active as the right eye continued to be at the time of observation. The patient complained especially of the difference in the complexion of the two sides of the face, the left side being remarkably pale and flabby; he was also distressed by the insensibility of the left half of his mouth, and by the constant state of abrasion of the left concha. A close examination proved the entire left side of the face to be insensible in the whole range of the trigeminus; the eye, the nostril, and the tongue, could be irritated in every possible manner, without producing the slightest impression. The slightest touch caused the Schneiderian and mucous membrane of the nostril and mouth of the left side to bleed. The left anterior and middle portion of the tongue were deprived of the faculty of taste, as proved by the application of powdered quinine, or rhubarb; at the same time the root of the tongue continued in undisturbed possession of its gustatory powers. The ulceration of the external ear depended upon the anæsthesia; for the fess, [illegible] usually worn by the Turks, and [illegible] has produced no such effects before [illegible] pressure and friction must have been the [illegible] reflex movements in the left side of the [illegible] brought the muscles of this side [illegible] with the same energy and rapidity with which [illegible] affected in the right half. This is probably [illegible] observation, conducted in a spirit of philosophic [illegible] based upon physiological principles, which has [illegible] of the Moslem; and the reader [illegible] equally indebted with me to Dr. Rigler, for [illegible] communication.

[illegible] case is taken from the letter of a former pupil, [illegible] Professor Fenger, of Copenhagen, whose treatise '[illegible] Ambulanti,' has already met with the approba- [illegible]. An old woman, of 57 years of age, after the [illegible] right breast for carcinoma, eight years before [illegible] Dr. Fenger's observation, had fallen into a [illegible] accompanied by atrophy and loss of power in [illegible]. She had for one year complained of violent [illegible] intermittent but afterwards continuous, on the [illegible] as far as the mesial line. In September, [illegible] same side of the face supervened, the [illegible] as before; sensation was much [illegible] was tenderness on pressure. The [illegible] be rotated outwards. [illegible] the cornea dull, and its [illegible] about two lines in circum- [illegible] the occurrence of [illegible] according to the patient's [illegible] right nostril; taste [illegible] half of the tongue. [illegible] the left side, the [illegible] unimpaired. The action [illegible] was normal. The progress of the [illegible] of the cornea, and a purulent [illegible] the cavities of the eye. Death [illegible]. The post-mortem exhibited the brain and [illegible] in a healthy condition. The right [illegible] much enlarged, having attained the size of a large hazel-nut, and being thick and indurated. The three branches of the fifth pair of the right side were considerably thickened up to their passage through the sphenoid bone. The upper and anterior part of the pituitary body was converted into a serous cyst; the remaining portion was enlarged into a tumour, to which the abducens was intimately adherent. The dura mater investigating the posterior surface of the petrous portion of the temporal bone was much thickened and degenerated, where it was traversed by the facial and acoustic nerves. Numerous growths of the character of medullary sarcoma were found in the liver and the right ovary.

Our knowledge of the anæsthesia dependent upon disease of the ganglion Casseri, has received valuable contributions by the recent excellent investigations of Norwegian elephantiasis, by Danielssen and Boeck.[1] I shall have occasion to treat of these researches more in detail, when I arrive at the subject of spinal anæsthesia.

d. If the anæsthesia of the fifth nerve is complicated with disturbed functions of adjoining cerebral nerves, it may be assumed that the cause is seated at the base of the brain.

We have now arrived at the last division of the peripheral side of the fifth pair; its morbid conditions also present definite characters. The motor portion of the fifth is generally involved in this case, and we then have paralysis of the masticatory muscles in the corresponding half of the face. The successive affection of other cerebral nerves, be it one or more, the oculomotor, the facial, the acoustic, must depend upon the local extent of the cause. Fungous and tubercular tumours, and sanguineous or albuminous extravasations, are the most frequent causes. The following case, though it had a favorable issue, is an illustration of what we have stated:

In the month of October, 1830, a woman of the lower orders, æt. 69, applied to me, and gave the following account of herself:—a week previously, while scouring a room with the window open, she was suddenly seized with a violent rushing noise in the left ear, and soon after perceived a tumour in the vicinity of the ear, which disappeared after four and twenty hours. The

---

[1] Traité de la Spédalskhed ou Eléphantiasis des Grecs; Paris, 1848.

[A full analysis of this work is given in the British and Foreign Medico-Chirurg. Review, vol. v, p. 171. 1840.—Ed.]

[illegible] examining [illegible] were [illegible] of the left eyelid, [illegible] was unable to [illegible] of the mouth, and [illegible] impression on the [illegible] cried, was [illegible] movements of the right [illegible] facial muscles by [illegible] produce an effect [illegible] active with [illegible] There was [illegible] and the anæs- [illegible] Pinching [illegible] the external [illegible] nostril was [illegible] feather, or [illegible] of the tongue [illegible] The left eye [illegible] surrounded by a [illegible] the surface of [illegible] ear was capable [illegible] up to the [illegible] the tongue and the [illegible] was abstracted [illegible] doses of tartar [illegible] then applied a [illegible] angle of the jaw, [illegible] after the [illegible] manifested [illegible] left eye, then [illegible] mouth, by [illegible] it with [illegible] which she [illegible] sensibility in [illegible] latter was [illegible] At last, [illegible] of febricita- [illegible] of December, [illegible] cured. The motility of the left half of the face and its expression was entirely restored, as well as the sensibility of the skin, with the exception of two small spots at the tip of the nose and the chin.

2. CENTRIC ANÆSTHESIA OF THE FIFTH PAIR.—The physiological characteristic of the affection lies in the crucial effect of the lesion; our diagnosis is established by the coincident affections of other nerves of the face and the trunk, and their loss of sensory and motor power.

In an article contained in Müller's 'Archiv für Anatomie, Physiologie, und wissenschaftiche Medicin,'[1] I have pointed out that this form of anæsthesia is found to accompany recent hæmorrhage in the brain. It affects the third branch of the fifth pair, of the side opposite to that in which the lesion is seated; one half of the chin and the lower lip externally and internally, the inner portion of the concha of the ear, the skin of the temple and the half of the tongue are deprived of their sensibility. In the cases hitherto observed, I have found these symptoms combined with paralysis of the portio minor of the fifth. The patient is affected with paralysis of the muscles of mastication, and is able to chew with the muscles of the opposite side of the face only. At the same time the facial nerve, (generally only the fibres that go to the alæ nasi and the upper lip,) the hypoglossus, and the nerves of the extremities, are involved, so that the disease manifests itself in the shape of more or less complete hemiplegia.

The effect produced is not in a crucial direction, if the disease, *e. g.* a tumour in the central structures, affects the point of insertion of the fifth nerve. This is illustrated by the following case given by Abercrombie:[2] A man attacked by hemiplegia, but not deprived of sensation in the arm and leg of the left side, had lost both sensation and motion in the left half of the face. Sensation was also destroyed in the left half of the tongue; though its power of movement continued unimpaired. The mucous membrane of the left nostril was permanently of a dark red colour, and hæmorrhage often took place from it. The conjunctiva of the left eye was much congested; opacity and ulceration of the cornea then ensued; and finally there was entire disorganisation of the eye. The patient often suffered

---

[1] 1838, p. 313.

[2] Loc. cit., p. 425.

CHAPTER XXI.

ANÆSTHESIA OF THE MUSCULAR NERVES.

The sensory nerves of the muscles, as we have previously shown, possess not only the power of conducting ordinary sensation, but also the peculiar sensation relative to the condition of the muscles, whether of action or of rest. Their morbid states, whether of an hyperæsthetic or anæsthetic character, present a type in accordance with these distinctions. Occasionally the sensibility of a muscle is abolished. Yelloly has described a case of anæsthesia,[1] in which a needle could be introduced into the ball of the thumb, so as to penetrate down to the bone, without causing the patient the slightest sensation.

A loss of the specific muscular sensation, the counterpart to vertigo, the fundamental character of which has been stated to be an impression of illusory movement, may occur in connection with anæsthesia cutanea or isolated. Bell[2] relates a few instances of the former. One of his patients had lost the power of sensation in the eye and eyelids by a tumour which compressed the nerves within the orbit; at the same time motion continued unimpaired in the latter, because the fibres of the facial nerve had not suffered by the compression. The patient was unable to say whether her eyelid was open or closed; but when told to close the eye that was already shut, the orbicularis was seen to act, and she compressed the eyelid forcibly. In another patient the sensibility of one half of the body was found to have become impaired after parturition, without a loss of motor power; she was able to carry the child on this side so long as her attention was directed to it, but as soon as it was drawn off, the flexor muscles gradually relaxed, and the child was in danger of falling. The corresponding nipple was also affected with anæsthesia, though the secretion of milk was not less copious on this side than on the other. When the mamma was distended, no pain was felt. She saw the child suck and swallow, but she had no sensation of it, as she experienced when it was put to the opposite breast. On the opposite side sensibility remained normal, while the power of movement was impaired. She was unable to carry the child on her arm; the grasp of the hand was powerless; the leg could only with difficulty be set in motion, and she dragged the limb in walking. Sensation not only continued undiminished on this side, but the patient complained of a permanent sense of heat, painful dragging, and an unusual sensibility to external pressure and slight mechanical injuries.

---

[1] Medico-Chirurgical Transact., vol. iii, p. 90.

[2] The Nervous System, &c.

In considering the nature of such cases, we might be easily induced to attribute the loss of muscular sense to the cutaneous anæsthesia; but Weber's[1] researches have shown that even in health a marked difference exists between the perception of the weight of bodies, according as we judge of it exclusively by sensation or by moving, and raising the weight together with the limbs upon which it rests. In the former case it is not easy to distinguish light bodies from heavy ones. "Observationibus illis probatur, mensionem ponderum solo tactu factam, plus quam duplo subtiliorem reddi, si ad eam perficiendam simul cœnæsthesis musculorum adhibeatur." In morbid states the difference between tactile sensation and the muscular sense is well marked. Thus Ollivier[2] details a case in which the patient had lost the cutaneous sense of touch throughout the right side in consequence of concussion; at the same time he was unable to form a correct estimate of the weight of bodies with his right hand. The physician observed by Marcet, who was affected with anæsthesia cutanea of the right side, was perfectly able to feel his patient's pulse with the fingers of his right hand, and to determine its frequency and force, but in order to determine the temperature of the skin, he was obliged to call in the aid of his left hand.

I have observed that anæsthesia of the muscles alone without loss of tactile power, invariably accompanies tabes dorsalis. A simple experiment suffices to determine the fact. If the patient is told to shut his eyes while in the erect posture, he immediately begins to move from side to side, and the oscillations soon attain such a pitch that unless supported he falls to the ground. Even if the trunk is supported, if the patient be sitting and leaning against the back of a chair, the phenomenon takes place to the same extent, and he will slip off the chair. From the commencement of the tabes dorsalis, as soon as the motor power becomes diminished, this anæsthesia manifests itself; it becomes more evident as the disease progresses; and it is only towards its termination, when the muscular debility approaches to paralysis, that it can no longer be clearly distinguished. The eyes of such patients are their regulators, or feelers; consequently in the dark, and when amaurosis supervenes, as is not unfrequently the case, their helplessness is extreme. Excepting during the last stage the skin remains sensitive; the complaints of the patients that they feel when they walk or stand as if a soft body, such as a layer of wool, intervened between the ground and the soles of their feet, must consequently be referred to the diminished muscular sense. Similar phenomena occur, though less frequently, in the upper extremities; Bell relates that one of his patients distinctly felt when the fingers of his right hand were touched, but that he had no perception of their position when his eyes were averted, so that he would say they were flexed when they were extended.

---

[1] De Pulsu, Resorptione, Auditu et Tactu, p. 89.

[2] Traité des Maladies de la Moëlle Epinière, 3d ed., vol. i, p. 509.

The doctrine of muscular anæsthesia affords an explanation of the fall of the body, and it may not be without interest to mention other causes of this occurrence in nervous diseases. I distinguish falling in paralysis, convulsive falls, and falling from loss of the balancing power and of the muscular sense. In the first the individual falls to the side on which the resistance is removed; thus in hemiplegia he falls to the paralysed side. In the second he falls as he is driven by the motor impulse, either forward or backward, or on one side, as in epilepsy; in either the direction of the fall serves for the diagnosis of the seat of the disease, which will be found in the opposite hemisphere of the brain. Lastly, when the sense of equilibrium and the muscular sense is abolished, the fall takes place according to the laws of gravitation.

sequent to operation, as recommended by Trousseau and others, but justly condemned by the bulk of the profession.

On the other hand, the sensibility of the bronchi, and especially of their ramifications, is indisputable; it manifests itself as pain, oppression, and dyspnœa, and by exciting the reflex action of the medulla oblongata, induces increased action both of the ordinary and the auxiliary muscles of respiration. Anæsthesia of the bronchi may be assumed to exist when we find painful sensations to be absent or to have ceased, though an exciting cause continues, and when the number of respirations is diminished. In proof of the former, Brachet has put forward the results of his experiments;[1] he found that animals, in whom, after division of the vagi, tracheotomy had been performed, breathed as freely under the bell of the air-pump, as if they had been in the open air, and that they died in half or three quarters of an hour without any suffocative attacks; Volkmann[2] however has demonstrated the fallacy and the error of his conclusions. Accurate experimenters agree in the observation that, after division of the two vagi, the number of respirations becomes much reduced. Sir Astley Cooper[3] mentions a case in which the number of respirations sunk from 135 to 48. Arnold[4] has confirmed this; and Traube,[5] who has instituted a series of admirable experiments, fixes the average reduction of the number of respirations in rabbits at two thirds; the average number of respirations of these animals in the recumbent position being $131\frac{1}{6}$; the average number, after division of the vagi, in the same position, $40\frac{1}{4}$.

We very rarely meet with pathological instances in which the peripheral portions of both vagi have lost their power of conducting impressions; and even in the few cases on record, the diminished frequency of respiration has been overlooked. I admit the same defect to exist in the following case, which was contained in the first edition of this work; still the absence of the perception of apnœa is dwelt upon.

---

[1] Recherches Expérimentales sur les fonctions du Système Nerveux ganglionaire, p. 157.

[2] Ueber die Bewegungen des Athmens und Schluckens, mit besondrer Berücksichtigung neurologischer Streitfragen, in Müller's Archiv, &c., 1841, p. 332.

[3] Some Experiments and Observations on Tying the Carotid and Vertebral Arteries and the Pneumogastric, Phrenic, and Sympathetic Nerves, in Guy's Hosp. Reports, vol. i, p. 457.

[4] Bemerkungen über den Bau des Hirns und Rückenmarks, p. 167.

[5] Beiträge zur experimentellen Pathologie und Physiologie; Berlin, 1846, Heft. i, p. 102.

On the 10th of May, 1837, I was called to see Otto H——, a child of two years old, who, according to the statement of his parents, had for some weeks been labouring under cough and wheezing respiration. During the last week a peculiar crowing sound had occasionally been heard; and the practitioner who had charge of the patient, assuming the presence of croup, had ordered calomel and leeches. When I saw the child, it was lying in bed; its cheeks were pale and skin cool; there was wheezing respiration, without any manifestation of distress in the face, and a short cough with a crowing sound and no fever. Pressure applied to the larynx and trachea, increased the dyspnœa, but did not increase the cough. No abnormities were elicited by percussion or auscultation. The child bore to have its head and neck raised without apparent inconvenience. Consciousness was unimpaired, and the power of deglutition unaffected. The question whether a membranous or purulent expectoration followed the cough, was negatived. No disposition to throwing the head back was observed, nor was I able to discover any increased action in the alæ nasi, the sterno-cleidomastoid muscles, or the diaphragm.

I evidently had to deal with the termination of an important disease; but the interpretation was difficult, as I had not seen its development. I was most struck by the contradiction between the absence of air and the absence of the perception of its want. I had never before met with anything like this in croup, bronchitis, or diseases of the heart, as long as the patient continued capable of receiving impressions. In croup the great excitement prevailing in all inspiratory muscles has always appeared to me an essential characteristic, and the violent distension of the alæ nasi is, in my opinion, a more trustworthy indication than the sound of the cough. In the case under consideration there were no violent movements of the alæ nasi, of the sterno-cleidomastoidei, or of the diaphragm; though consciousness was unimpaired there was no expression in the features of apnœa, and yet there was no doubt of the fact that the entrance of the air was impeded. Death ensued four and twenty hours after I had seen the child, with increased rattle in the breathing.

There was no trace of congestion or exudation in the larynx and trachea; the mucous membrane was pale. A moderate quantity of frothy, serous fluid was found in the bronchi and their ramifications, which were traced into the lungs. The lungs contained more of it, and of a reddish colour. Both vagi were surrounded and compressed in the neck by a mass of tumefied lymphatic glands, filled with tubercular matter and pus; and the nerve evidently flattened in some parts. Some of the glands were of the size of small cherries.

The perception of the want of air, the besoin de respirer, only ceases when the conducting power of the two vagi ceases, for interruption, occurring on one side only, is more prone to induce attacks of dyspnœa and asthma, on which subject we shall have occasion to dilate in another part of this work.

Central anæsthesia of the vagus is frequently observed in diseases of the brain, and especially in apoplectic conditions; it is not uncommon in diseases of the lungs that terminate fatally, in which case it manifests itself by the cessation of dyspnœa and of the painful sensations, by diminution of the number of respirations, cessation of the cough, and the arrest of expectoration, although loud mucous râles continue.

We do not possess a sufficient supply of proper observations, either in the domain of pathology or of experimental physiology, to determine the relations of anæsthesia in the gastric branches of the vagi. Possibly it gives rise to the loss of the sense of repletion, when the stomach is filled with aliment; Swan[1] even relates a case in which there was atrophy and disorganisation of both vagi, and the patient never felt his stomach to be filled though he took ever so much food, a condition of insatiability and insensibility which continued to the last; the case does not, however, meet the requirements of philosophical criticism.

---

[1] A Treatise on Diseases and Injuries of the Nerves; London, 1834.

still more the case in an eye affected with strabismus, and therefore amblyopic. If a necessity for exercising the organ arises, as from disease of the opposite eye, the short sightedness soon ceases, at times with extreme rapidity, as we may convince ourselves in the operation introduced by Dieffenbach for strabismus. A greater difficulty presents itself when we have to determine whether the loss of sight is the effect of real anæsthesia, or whether it depends upon an obstacle to the manifestation of the still existing activity of the retina by exudations, opacity of the vitreous humour, &c. I think it worth while to mention a physiological criterium by which this condition may be recognised. The quiescent state of the optic nerve is conveyed to our consciousness as an impression of darkness; when the nerve has lost its conducting power, no sense of its rest or of darkness can continue, whereas it must continue if its action is merely interrupted. We may thus account for the difference in the sensations of blind persons. Some despair on account of the impenetrable night that surrounds them, while others have the advantage of feeling the loss of the optic powers only as a blot in the field of vision. We should also make the experiment of producing the impression of figures, by pressure, in the amaurotic eye, and if we fail in this we may look upon it as a proof that the nerve has lost its excitability.

The nebulous spots or black dots dependent upon partial anæsthesia, are said by Valentin[1] to be distinguishable from those caused by small exudations or varicosities, by continuing as a yellow spot in the subjective luminous images, while the latter disappear.

Amaurosis has a centric or a peripheral origin. Any changes occurring in the course of the optic nerve, from the retina to the insertion into the brain, may give rise to peripheral amaurosis, whether the changes have been developed in the nerve tissue itself, or originate in the surrounding tissues, and thus arrest the conducting power.

The most perfect instance of peripheral amaurosis is presented to us in the traumatic variety.[2] Vision disappears suddenly after the injury, either partially or totally; fiery lightning-like phenomena occur. The expression of the eye is staring, and there is often strabismus. The iris is immovable, the pupil dilated, and generally irregular—it is sometimes drawn so much to one side, that its edge lies close to the edge of the cornea, and at first sight appears totally absent. The injury, whether a concussion, laceration, or bruise, affects the eyeball or its vicinity. Authors dwell particularly upon injury to the supraorbital region, and have assumed a sympathetic relation to exist between the supraorbital and optic nerves. It has been customary to quote Hippocrates in support of the doctrine, that wounds of this region endangered vision; we may particularly refer for the details of this theory to a programme of Platner's: de vulneribus superciliis illatis cur cæcitatem inferant, ad locum Hippocratis, &c. The distinguished ophthalmologist, Beer, did not hesitate to attribute to the affection of the frontal nerve that variety of amaurosis, which occurs some time after the injury, in consequence of defective cicatrisation; he even states, that he has cured two cases of this kind by making deep incisions down to the bone, near the supraorbital foramen, and thus dividing the stretched filaments. But this must have been an error of Beer's. In order to satisfy myself on the subject, I experimented upon a goat several years ago, and applied ligatures to the different supraorbital nerves that issue from several orifices, but no amaurosis ensued, and the animal died some weeks after of softening of the brain. Professor Hertwig had the kindness to repeat the experiment on the 6th of June, 1839, upon a horse in the veterinary school. The supraorbital nerve was exposed on the right side. As often as it was irritated by the lancet, vivid pain was manifested, the evidence of which was starting of the head and a jerk of the entire body. At the same time there was much winking, closing of the eye, and increased lacrymation. The irritation of the nerve exerted no influence upon the retina; it continued to maintain the same position and size, and behaved exactly as the pupil of the left eye. The ligature was subsequently applied at about three lines above the exit of the nerve, and firmly tied. No alteration was perceived either in the powers of vision or in the pupil. For another purpose, the central part of the nerve was touched with chloride of antimony. On the fourth or fifth day, the right eye was half closed, the lower eyelid being much swollen and œdematous; a large quantity of tears was being constantly secreted, which ran out of the internal angle of the eye, and from the right nostril over the cheek. The pupil was normal. It was evident that vision was unimpaired, for when threatened with a stick from behind, or with the finger before the eye, the animal started; but all movements were heavy, and there was evident stupor, even when the head was held down. On the seventh day, the horse was attacked with violent convulsions, and lay in death throes. Vision was now extinct, and a considerable quantity of thick viscid fluid was discharged from the eye. A few hours after death, Professor Gurlt examined the body. The supraorbital nerve was completely included in the ligature; the portion touched with the butyrum antimonii was mortified, of a grey colour and soft consistency. The nerve was otherwise perfectly normal throughout its course within the cranium, and no morbid appearance was demonstrable either in any other part of the fifth pair or in the brain itself.

---

[1] Loc. cit., p. 16, § 32.

[2] See Jüngken; die Lehre von den Augenkrankheiten, 2d ed., p. 780.

I have since discovered that Vicq d'Azyr has instituted similar experiments, induced by his meeting with the case of a young man, in whom the supraorbital nerve was divided by the thrust of a foil, in consequence of which amaurosis gradually supervened. He inflicted every variety of injury upon the nerve in several quadrupeds, but in none of them did blindness ensue; only occasionally twitchings of the eye and increased lacrymal secretion followed.[1]

I cannot conclude, without quoting the statement of my experienced friend, Professor Jüngken, that he never met with anything resembling the instances that Beer speaks of; but that in such cases the amaurosis was exclusively the consequence of a concussion of the eye-ball or of lesion to the brain.[2]

Inflammation of the retina, which rarely occurs in a primary form, but generally in combination with inflammation of other tissues of the eye, is accompanied by the most intense photopsia, which increases in the same ratio as vision becomes impaired. It runs a very rapid course, terminating in from twenty-four to forty-eight hours.

---

[1] Histoire de la Société Royale de Médecine, Année 1776; Paris, 1779, p. 316.

[2] See von Walther; Ueber die Ciliar Verletzungen und die Amaurose, in v. Gräfe und v. Walther's Journal der Chirurgie und Augenheilkunde, vol. xxxix, p. 505.

At the base of the brain and cranium, the conducting power of the optic nerve is chiefly interrupted by tumours and extravasations; some rare cases are on record, in which it was destroyed by wounds penetrating through the orbit; Larrey has detailed a remarkable instance of this.[1]

"A fusileer of the old Life Guards, while playing with the foils, was wounded in the right eye, by the foil breaking and entering at the inner side of the orbit; it passed under the eyebrow, through the lid, in a slanting direction from the right to the left, and from before backwards. The first symptoms that occurred, were violent pain at the left side of the forehead, numbness of the left half of the body, and slight twitchings of the facial muscles, but without loss of consciousness. Soon after hemiplegia supervened, most marked in the arm, sensation continuing. The pulse was 45, respiration and deglutition were laborious; and the patient had great difficulty in articulating a few words. Obstinate constipation and retention of urine followed, with vertigo on the slightest movement, and inclination to syncope. On the nineteenth day the cerebral symptoms, with the exception of the hemiplegia, abated. While the head was at rest, the patient was only able to see the horizontal half of objects occupying the axis of vision; when they lay to the inner side of the axis, towards the nose, they became gradually developed, so that he could see them entire; but if they lay outwards towards the temple, they disappeared in the same manner. No change, either as to form or motility, was perceptible in the pupil of the affected eye. Death ensued three months after the accident. On dissection, a perforation, three lines in diameter, was found at the inner portion of the orbital plate of the frontal bone in the vicinity of the ethmoid bone; a thin layer of cortical tissue remained attached to the aperture. The corresponding point of the cerebrum exhibited a similar defect, leading to a canal which took a superficial course towards the inner edge of the right anterior lobe, passing over the olfactory nerve of this side. It penetrated to the extent of two lines into the left hemisphere, crossing the left optic nerve and the root of the right. The latter was injured at its origin, and beneath the anterior cerebral artery, which presented a considerable dilatation at this point. The point of the foil had penetrated to the lower wall of the lateral ventricle, close to the left crus cerebri. The oblique channel was from two and a half to three inches long, lined with a coagulum, but free from pus."

---

[1] Clinique Chirurgicale, vol. i. p. [illegible]

In this case, the amaurosis dimidiata was caused by injury of the external part of the right root of the optic nerve, and proves that the external part of the fibres of the chiasma pass to the eye of the same side; similar effects may be produced by exostoses occurring on the sphenoid bone. I assume this to be the case on both sides in a girl of twelve years affected with epilepsy, in whom the outer half of both eyes has lost its susceptibility to light. In an amaurotic boy, who was attacked with mania a short time before death, Beer found a considerable spicula at the side of the sella turcica, which had penetrated the optic nerves at the chiasma.

The most frequent causes of amaurosis are, sero-albuminous exudations at the base of the brain, compressing the chiasma, and commonly the result of meningitis. The oculomotor nerve, from its close proximity, is generally involved at the same time, so that convulsions or paralysis of the muscles of the eye are found to coexist.

Centric amaurosis is caused by any influence which abolishes the conducting power of the optic fibres within the brain. The accompanying symptoms are such as are attributable to the brain as a central organ; they are cephalalgia, vertigo, sympathetic affections of other organs of sense, psychical derangement, convulsions, (*e.g.* eclampsia parturientium,) especially paralyses of the motor nerves of the eye, the face, the tongue, and the extremities. The eye itself presents no peculiar symptom, except great rigidity and immobility of the iris. The seat of the disorganisation may be in the cerebrum or in the cerebellum,[1] and in either it may occupy various points, the thalami optici or the hemispheres, without any immediate relation to the optic thalami. The rule of crucial conduction is found to prevail; but there are cases on record, in which the eye of the side corresponding to the injury is said to have been amaurotic; this is contradicted by the experiments made upon animals, and is probably to be accounted for by the observer having interpreted changes occurring at the base of the brain, and involving the peripheral nerve, as central affections, compressing tumours, softening, extravasation of blood, and the accumulation of serum in the ventricles, are the lesions most frequently met with. In the amaurosis, not unfrequently complicating tabes dorsalis, we find atrophy of the optic nerve of the chiasma and the optic tracts; the thalami optici also may, one or both, be atrophied and otherwise altered in colour and texture.

---

[1] Andral; Clinique Médic., vol. v, pp. 686 and 737.

In addition to the diagnosis of the seat of the affection, we possess an etiological diagnosis for amaurosis, as for diseases of the eye generally, for which we have to thank the laborious researches of celebrated ophthalmologists, and especially of Professor Jüngken. The objective characters of amaurosis caused by congestion, exhausting discharges and tabes, by gastric affections, arthritis, syphilis, &c., have been so extensively described in the works alluded to, that I need not enter into the details of these matters, and shall confine my own remarks to a few points which have met with little attention.

Among the causes predisposing to optical anæsthesia, we have to enumerate hereditary taint, the middle period of life, in the female sex the climacteric, and the development of pigment; amaurosis is rare in grey and blue eyes, as compared with the liability of dark irides. Among the specific substances which suppress the activity both of the ciliary and the optic nerves, we must mention belladonna and hyoscyamus. Lead poisoning, especially by an atmosphere filled with lead dust, occasionally gives rise to amaurosis, either in combination with other nervous affections that precede, or are associated with it, such as colic or saturnine epilepsy, or, though rarely, by itself. It generally supervenes suddenly, runs a rapid course, lasting only a few hours or days; or in exceptional cases, extending over a longer period. Both eyes suffer at the same time, and in an equal or different degree. The pupil is dilated, unequal, variable. Tanquerel des Planches[1] has observed twelve cases of the affection.

The post-mortem examination made of amaurotic patients, agree in the observation of atrophy of the optic nerves.[2] The peculiar corpuscles recently discovered in the retina, by the aid of the microscope, are no longer visible,[1] and the optic nerves are at times reduced to their mere neurilemma. When the atrophy extends as far as the optic thalamus, the latter becomes lower, narrower, flatter, more grey, and loses its medullary tissue; the opposite thalamus, at the same time, may be large and more bulky than in the normal condition.[1] It is important to attend to the relation of the optic nerves anterior to the chiasma, to the tract posterior to it, and to the thalami. All observations coincide in demonstrating a partial decussation. This accounts for the apparent contradiction involved in the different cases, that show that the portion posterior to the chiasma and the thalamus of the same side were affected, while in others the parts of the opposite side, and again in others, both optic nerves posterior to the chiasma, and both thalami, were atrophic. Vrolick, Magendie, and Lelut, have even found the atrophy extending to the corpora quadrigemina.[2] It is difficult to determine whether the atrophy of the nerve is a cause or effect of the anæsthesia. In animals, the mere inaction of the optic nerve, as accompanying opacity of the cornea artificially induced, is rapidly followed by atrophy of the corresponding nerve, anterior to the chiasma,—a circumstance not observed in man. Not long ago, I had an opportunity of examining the optic nerves minutely in an hemiplegic individual, who for nine years had been blind in his right eye from capsulo-lenticular cataract, and there was no atrophy.

---

[1] Traité des Maladies de Plomb, vol. ii, pp. 208—225.

[2] Jos. et Car. Wenzel, de Penitiori Structura Cerebri Hominis et Brutorum, pp. 112—197.

With the exception of the variety induced by lead-poisoning, amaurosis is rarely acute; it generally endures for a series of years, for half a life, or more. In several aged amaurotic patients, I have observed obstinate insomnia.

The affection, for the most part, presents a continuous, rarely an intermittent type. Beer has met with one case of amaurosis occurring on every third day, another with a double tertian type. In the former, the amaurosis was complicated with a dull pain in the head and somnolency; in the second, with a distinct glaucomatous disorganisation of the vitreous humour, and violent headache and pain in the eye. In these cases vision, which during the paroxysms was entirely abolished in both eyes, returned in the intervals and in one of the patients;

---

[1] Meckel; Handbuch der Pathologischen Anatomie, vol. ii, p. 319.

[2] Longet; Anatomie et Physiologie du Système Nerveux, vol. ii, p. 73.

a female, every trace of opacity of the vitreous body disappeared on the free days. Amaurosis has also been observed to occur as a symptom accompanying the paroxysms of ague, associated with intense headache. The anæsthesia of the optic nerve, dependent upon the position of the sun, excites a peculiar interest, and has been termed *cæcitas diurna* and *nocturna*.[1] Vision is diminished, and ceases either with sunrise, and returns towards night, the less frequent case, or it disappears at sunset and is restored at sunrise (*nyctalopia*.) Both eyes are almost always equally affected, but the affection varies in degree. At times, lanciuating pains in the limbs precede, which disappear with the commencement of the disease, and show themselves in the eye. The pupils are dilated and indolent, or contracted and irritable. In orphan asylums, the disease sometimes occurs endemically, and at definite seasons; it has also been observed as an epidemic, especially in combination with scurvy. Jüngken has often met with it in boys and girls consequent upon masturbation, and as an accompaniment of hysteria. Cold, malaria, and the exclusive use of coarse vegetable food, have been proved to cause it. Nightblindness occurs in Russia extensively among the poor during Lent.[2]

The *prognosis* is generally very unfavorable. Cases of cure are rare, excepting in saturnine and periodic amaurosis. The only consolation the medical man can offer, is to hold out the prospect that the affection will remain stationary at the stage of amblyopia, if the causes are removeable, and medical aid has been called in sufficiently early. To attain even this, the patience of the physician, as well as of the patient, is greatly taxed. The mind of the patient is distressingly busy in anæsthesia, as we have found it to be in hyperæsthesia of the optic nerve; and while he is growing blind, he is a source of great trouble to his medical adviser; after he has become blind we find him resigned.

---

[1] The Greek terms *hemeralopia* and *nyctalopia* are improperly applied by authors; etymologically nyctalopia means nightblindness, and in this sense Bergen has used it in his dissertation 'De nyctalopia s. cæcitate nocturna;' Hemeralopia is a term that does not occur in Greek authors; but if we apply the same rule, it can only mean dayblindness. See Coray's excellent edition of Hippocrates' *Περὶ ἀέρων ὑδάτων καὶ τόπων*, vol. ii, p. 46.

[It appears that the Germans use the terms differently from British pathologists, who apply nyctalopia, according to its etymological meaning, to night-vision or day-blindness.—Ed.]

[2] Ruete; Lehrbuch der Ophthalmologie, p. 605.

The *treatment* hinges upon the cause, and must also be adapted to the individual constitution of the patient. From this it follows, that the remedies vary, and that the much lauded specifics are fallacious. For the amaurosis originating in lead poisoning, Tanquerel advises the use of drastic purges, the endermic application of strychnine on two small blistered surfaces on the forehead and temple, and electricity. He considers these remedies particularly useful, provided the exciting cause be avoided. In one case which I attended,[1] they all proved useless. The indications for the local treatment of amaurosis, which is too often erroneously based upon the assumption of nervous debility, are as definite as they are for the general treatment. The reader will find a complete exposition of the subject in Jüngken's work,[2] to which I must refer him.

[1] Klinische Ergebnisse, p. 17.

[2] Lehre von den Augenkrankheiten, p. 851, & seqq.

CHAPTER XXIV.

ACOUSTIC ANÆSTHESIA.

This anæsthesia may be defined as the absence or loss of the power of the acoustic nerve, to perceive impulses of solid bodies, or vibrations of the air, as sound, owing to a diminution or loss of the conducting power, or excitability of the acoustic nerve.

The ordinary term deafness and other designations, as surditas, or cophosis, also comprise that hardness of hearing which results from impediments to the physical propagation of the sound waves, owing to diseases of the organ of hearing.

In health, we meet with variations in the perception of sound, which must not be overlooked, if we wish to form a correct estimate of deafness. There are many persons whose hearing generally is good, but whose power of hearing high notes is very limited.[1] The range of hearing differs in different individuals.

In acoustic anæsthesia the loss of hearing generally commences in one ear, gradually and almost imperceptibly; it rarely affects both organs at the same time. At first distant sounds only are indistinctly perceived. There is a difficulty in following a general and animated conversation, the sounds becoming confused. After a time the opposite ear suffers, and the deafness increases. Sooner or later tinnitus aurium supervenes; it is at first indistinct, but as the disease increases, becomes loud and sonorous. This noise not unfrequently extends from the ear to the entire head. Certain circumstances exert an undoubted influence upon the improvement or increase of the affection. It is augmented by mental fatigue, depressing emotions, by damp, stormy, or cold weather, or debilitating discharges; while light-heartedness, a hopeful frame of mind, and a dry mild atmosphere relieve the patient, though but temporarily. The same applies to loud noises in the vicinity, *e. g.* driving in a rattling carriage, the ringing of a bell, the beating of a drum, &c. Anæsthesia of the acoustic nerve either remains permanently at this stage, or complete deafness ensues, to such an extent that hearing can no longer be excited by any stimulant. In this case the tinnitus generally ceases.[1]

---

[1] Müller's Elements of Physiology, Dr. Baly's edition, vol. ii, p. 1309.

Some symptoms occurring in the ear itself deserve attention. One is the cessation of the secretion of the wax; the external meatus becomes dry, and the investing epidermis peels off in scales or branny particles, a symptom set down by Itard as a sure sign of deafness from anæsthesia of the acoustic nerve. Kramer has found the membrana tympani to be white as paper, and opaque. The cutaneous sensibility of the skin and its vicinity becomes dull, and may be altogether extinguished. The meatus becomes so insensible to contact that the patient describes his sensations in cleaning the ear, as if he were touching a piece of parchment. The dullness of sensation also extends to the temples and the parotideal region; the patient himself says that these parts feel numbed and dead. Itard has found this insensibility so intense in two individuals, that even incisions made into the cutaneous coverings of the neck were not accompanied by pain.

The *diagnosis* of the deafness caused by anæsthesia of the auditory nerve depends not alone upon the criteria, to which we have just alluded, but is materially aided by some negative symptoms, which we derive from a local investigation, and by acoustic experiments. The meatus when examined by the speculum presents no abnormity. The cavity of the tympanum and the Eustachian tube are free from accumulations. Müller,[2] assuming that hearing the impulses of solid bodies, communicated by solid bodies to the bones of the head, must continue while the labyrinth is sound, proposes that we should avail ourselves of this means in deaf subjects who do not hear atmospheric undulations, in order to determine whether the labyrinth and its auditory nerve is intact. In making the experiment, we must distinguish between the perception of the vibrations as a tremulous movement and the perception of an acoustic sound. We perceive the vibrations of sounding media as a tremulous motion, by aid of the cutaneous nerves, as we ascertain by laying our hand upon the chest of an individual while speaking: it is probable that the sensory filaments of the fifth nerve that are distributed to the membrana tympani are destined for this purpose. Deaf and dumb persons look round when anybody stamps upon the ground behind them: this fact is available in forensic medicine in cases of simulated deafness, and has been made use of by quacks, such as Mesmer and his school, to induce a belief that they had restored the sense of hearing to deaf persons.[1]

---

[1] See Itard; Die Krankheiten des Ohrs und des Gehörs; Weimar, 1822, p. 412, &c.—Kramer; Die Erkenntniss und Heilung der Ohrenkrankheiten, 2d ed.; Berlin, 1836, p. 334 & seq.: Dr. J. R. Bennett's translation, p. 256 & seq.

[2] Elements of Physiology, Dr. Baly's translation, vol. ii, p. 1283.

We have yet to advert to the influence exerted by deafness upon other functions. As he is incapable of enjoying the pleasures of society, the deaf person avoids it or rarely seeks it, and this circumstance exerts a marked influence upon his mental faculties. The voice suffers more or less, and rarely retains its pitch. In children speech is generally lost altogether, even if they had acquired it perfectly previously to becoming deaf. Itard has observed that deaf persons are less easily acted upon by purgatives, and are generally less susceptible to medicinal agents.

It has been erroneously stated that the loss of hearing is compensated for by the greater acuteness of another sense; this is never the case.

The causes of deafness must be divided into such as destroy the conducting power of the peripheral or of the centric tract of the auditory nerve. Among the former we must enumerate sudden, violent concussions of the acoustic nerve, by loud explosions, thunder, &c., or by concussion of the cranial bones (*e. g.* by a vigorous box on the ear,) injury or laceration accompanying fractures of the cranium, compression by tumours seated in the petrous bone and at the base of the brain. Among the central causes, disorganisation of the brain is the most frequent, whether idiopathic or resulting from destruction of the petrous bone by osseous tubercle. In the cases that have been hitherto placed on record, the cerebellum, though not exclusively affected, has generally been found to be the seat of disease together with the cerebrum.

---

[1] Rudolphi; Grundriss der Physiologie, vol. ii, p. 148.

lost patience and interest in the matter, and charlatanism therefore appropriated this class of diseases with bold audacity. We may, therefore, congratulate the profession upon the endeavour that has been recently made to discover indications for treatment, and the suitable remedies. We can scarcely venture to speak of the indications as to the causes of the complaint, while our present ignorance of the etiology continues. The antigastric and derivative method, the application of counter-irritants, &c., have maintained an undeserved reputation. Itard, and more particularly Kramer, have advocated the local application of stimulants, in the shape of vapour. The latter author advises the use of acetic ether by means of a special apparatus. The vapours are conducted by means of a tube through the Eustachian tube into the cavity of the tympanum, from whence they pass into the labyrinth to the auditory nerve. In selecting the remedy the character of the anæthesia is to be had regard to, and we are to vary it according as the disease presents an erethic or torpid type. Tinnitus aurium and great susceptibility to loud noises are said to be characteristic of the former, while the absence of tinnitus is said to mark the torpid variety.

It is difficult to determine the seat of acoustic anæsthesia; when peripheral it is commonly confined to one side, and when produced by a tumour at the base of the brain, the deafness is generally accompanied by paralysis of the face. At this moment a patient presents himself to my memory, who, owing to a violent external pressure of the cranium, has retained paralysis of both facial nerves and difficulty of hearing on both ears. Centric deafness is almost invariably associated with anæsthesia of other nerves of sense, especially of the optic nerve, and with paralysis and loss of memory.

Hereditary influences and advanced age afford a predisposition. Kramer states, that in one third of the patients a similar affection may be traced in their parents or brothers and sisters. Sympathetic deafness has often been spoken of, and it is stated to be especially complicated with intestinal affections, but its real existence is not proved. Irregular dentition, whether of the first teeth or of the wisdom teeth, is often accompanied by deafness, as proved by the authority of Nuck, Valsalva, Itard, and Hesse. It frequently occurs during the critical periods of nervous fevers.

The few careful dissections that have been made of the auditory nerve in deafness, have proved that it becomes atrophied in the same manner as the optic nerve in amaurosis.[1]

The prognosis of anæsthesia acoustica is generally unfavorable. The degree and duration of the affection and the age of the patient assist in the determination. It may be laid down as a rule, that there is scarcely any prospect of improvement when the disease has become so far developed, that the ticking of a watch, which a healthy ear hears at a distance of thirty feet,[2] is scarcely, or not at all, heard when applied to the affected ear.

The longer the malady has endured, especially after the application of searching remedies, the less hope exists. The prospect is most favorable in persons under twenty years. The deafness of advanced age is incurable.

The treatment hitherto pursued has been confused and unsatisfactory. From not possessing positive data, physicians

---

[1] See Lincke; Handbuch der Theoretischen und Praktischen Ohrenheilkunde, vol. i, pp. 591 and 641; Leipsig, 1837.

[2] Kramer, loc. cit., p. 347.

CHAPTER XXV.

ANÆSTHESIA OLFACTORIA.

Anosmia.

The loss of smell caused by anæsthesia of the olfactory nerve is but rarely observed; in the few cases that have been published, it evidently depended upon disorganisation and tumours occupying the base of the brain. Thus, Loder[1] met with anosmia as a consequence of scirrhus of the pituitary body, and Oppert[2] found an abscess of the pituitary gland compressing the olfactory nerves in a female suffering from anosmia and facial neuralgia.

The relation existing between the sense of smell and the sensibility of the nasal cavities is a matter of physiological interest. It is well known to what erroneous conclusions Magendie was led, by confounding the sensibility of the lining of the nose with the sense of smell; in spite of the corrections of Bell and others, he still maintains his former view, that the fifth is the nerve of smell, and that the olfactory nerves must be reckoned among those parts of the brain, with the functions of which we are not as yet acquainted.[3] When we institute experiments upon men or animals, we cannot be too careful to distinguish the effects of sensation and smell. In rabbits Valentin found that dead bodies served as a test; a healthy animal with its eyes tied, instantly scents the dead body and snuffles about it; whilst another, whose olfactory nerves had been divided within the cranium, touches it as if it were a piece of wood, and exhibits no symptoms of scent. In morbid conditions we meet with loss of smell without concurrent anæsthesia of the mental cavities. Thus, H. Cloquet speaks of a patient affected with anosmia, whose father had also been subject to the same disease, who was able to perceive the difference between coarse and fine snuff, and sneezed when he took a pinch; he was insensible to the fetor of the dissecting room, and equally so to the stench of the privy, although the gases in the latter were pungent enough to irritate the nose. Bichat[1] knew a man, who had lost his smell in consequence of an abuse of mercurials, but whose nasal mucous membrane was very sensitive to tickling. I have seen a person, who, in addition to other symptoms of cerebral disorganisation, had completely lost his sense of smell, so that if the oil of asafœtida was held to his nose it did not affect him; at the same time irritation of the nasal twigs of the fifth pair was followed by the usual reaction. In my clinical reports[2] I have given the case of a female thirty-three years of age, who was affected with well-marked symptoms of lues venerea, with nocturnal exacerbations of pains in the bones, nodes of the frontal, the parietal bone, and the left humerus. At the same time there was complete anosmia, with unimpaired sensibility of the nasal mucous membrane. The mercurial treatment that was adopted caused the tumefactions of the bones and the other symptoms to disappear, and the smell returned in a corresponding ratio. The most decisive case is one described by Pressat and quoted by Longet,[3] in which the olfactory nerve was entirely absent at the base of the brain, and there were no orifices in the ethmoidal plate, with the exception of those destined for the ethmoidal branches of the first branch of the fifth pair. This individual was affected with complete anosuria, though the sense of feeling in the nostrils was intact; he perceived all irritating and pungent substances, sneezed when snuff or pepper was applied; and though he did not smell ether when held to his nose, he was conscious of a pricking sensation, as if salt had been introduced into his nose.

---

[1] Observatio Tumoris Scirrhosi in basi Cranii reperti; Jen. 1790.

[2] Dissertatio inaug. de vitiis Nervorum Organicis; Berol. 1815.

[3] Leçons sur les Fonctions et les Maladies du Système Nerveux, p. 281.

The loss of cutaneous sensation occasionally exerts an influence upon the energy of the nerve of smell. In one case of anæsthesia of the fifth nerve of the left side of the face, which now presents itself to my mind, the sense of smell is less strong in the left than in the right nostril. In other cases of a similar description this has not been observed; for instance, in one given by Bell, it is expressly stated that, although a quill feather could be introduced three inches up the left nostril, it caused neither sensation nor titillation, and yet smell was unimpaired in both nostrils.

---

[1] Dict. des Sciences Méd., vol. xxxvii. p. 242.

[2] Klinische Ergebnisse, p. 18.

[3] Anatomie et Physiologie du Système Nerveux, vol. ii, p. 39.

The influence of respiration upon the activity of the olfactory nerves is well known; a reference to this fact explains the weakened sense of smell in facial paralysis, which causes a paralysis of those motor nerves which supply the muscles of the alæ nasi.

Nobody doubts the existence of a connection between smell and taste in health; we do not possess a sufficient number of observations to determine how this relation is affected in anosuria. In Cloquet's case the taste was unimpaired.

CHAPTER XXVI.

ANÆSTHESIA GUSTATORIA.

Ageustia.

What we include under the above term is the loss of taste owing to the conducting power of the nerve of taste having been destroyed: this distinguishes the affection from an impairment of the sense of taste, resulting from conditions which prevent the action of a rapid substance upon the nerves, *e. g.* dryness of the tongue.

We have yet to determine which of the nerves supplying the tongue performs the gustatory functions. All observers coincide in one point, that it is not the hypoglossus; but the contest is still carried on, as to whether this function belongs to the lingual branch of the fifth or the glosso-pharyngeal, and the advocates on either side have anatomical, experimental, and pathological evidence to bring forward in support of their views. The pathological facts more immediately concern us.

The following observations may be adduced in proof of the gustatory powers of the fifth:

1. A case communicated by Sir C. Bell.[1] Anæsthesia of the second and third branch of the fifth pair of the left side, was accompanied by loss of taste and sensation in the corres-
nding half of the tongue. An encysted tumour was found
have compressed the fifth nerve to such an extent that it
ared flattened and atrophic. The facial and acoustic
n had also suffered from the pressure.

A case described by Bishop.[2] There was anæsthesia of
ft half of the face and head—the left bulb was insensi-
touch, though the eye-sight was unimpaired. The most
ful irritants, ammonia or tobacco, applied to the left nos-
oduced no effect, while the sense of smell continued.

---

[1] The Nervous System, &c.

[2] Müller's Archiv, 1834, p. 132.

The left half of the tongue was perfectly insensible to sensory or gustatory impressions. There was a scirrhous tumour on the inner surface of the sphenoid bone, extending laterally to the internal auditory foramen, and backwards as far as the pons Varolii, which was superficially ulcerated. The tumour completely blocked up the foramina, by which the three branches of the fifth pass out of the skull.

2. The following case was published by myself in Müller's Archiv, 1838, p. 305:

A widow, aged 42, had, four years previous to the period of observation, received a severe injury by falling down stairs backwards, with a heavy basket, and striking her occiput. A year after the catamenia ceased. Since this period, she was subject to fits of sneezing, which increased in violence and frequency, deprived her of sleep, and were excited by the most trivial cause. Nothing irregular was discovered on examining the nostrils; the injury that had preceded, induced me to suspect some lesion within the cranium, which irritated the nasal twigs of the trigeminus. I tested the sensibility of the parts to which the first and second branches are distributed, but discovered no aberration; but on experimenting upon the third branch, in order to comprise the whole sphere of the fifth pair, I found anæsthesia throughout its course on the left side. I shall condense the results of the experiments which I have repeatedly made before the students attending my lectures, as well as in the presence of Professor Müller, and other medical friends.

The left half of the lower lip, externally and internally, and the left side of the chin, were insensible to pricking with a sharp vaccine needle. The same was the case with the left concha and external meatus, which were entirely insensible, and did not even display any sensation when a lighted taper was introduced. The skin of the left temple, in the vicinity of the hair, was equally insensible. The left half of the tongue also partook of the anæsthesia; pricking caused no pain at the lip, nor at the edges, nor in the middle, nor was there any perception of heat or cold. On the right side, the corresponding parts possessed the normal sensibility; and in the left half of the face, the other nerves of sensation retained their integrity; so that the range of the third branch could be very accurately defined. When the skin of the temporal region was scratched nearer the forehead, the patient at once drew back, from the tract of the frontal nerve having been invaded. Pricking the horizontal ramus of the lower jaw, caused a vivid sense of pain, as the upper cutaneous branches of the third cervical nerve retained their conducting power. On the other hand, the left half of the tongue was entirely deprived of the power of taste. The patient could not taste the most varied articles of diet on this side, while the sense of taste was normal on the opposite side. Thus he remained quiet, when I strewed a little powdered colocynth upon the affected half of the tongue; but instantly made a grimace, and exclaimed, " how bitter!" when I placed some on the right side of the organ, and attempted to get rid of the unpleasant impression by spitting out the powder. The same occurred when salt or sour substances were applied.

Though a partial disturbance was manifested in regard to sensation, none was perceptible in the motor functions of the left half of the face. Neither in the features, nor in the respiratory or masticatory movements, was any difference between the left and right sides to be discovered; they were performed normally. The same remark applies to the articulatory and masticatory movements of the tongue; nor was the nutrition of the left side at all impaired. Dimensions, temperature, and colour, were identical on both sides. The blood exuded as freely and copiously from the small punctures on the left as on the right side. The tongue was equally moist and furred on both sides. From these symptoms I formed the following diagnosis:

The anæsthesia being confined to the third branch of the portio major of the trigeminus, it was to be assumed that the affection of the branch was isolated; and, moreover, that it was the result of compression, as it was mere anæsthesia unaccompanied by painful sensations in the anæsthetic parts, at least during the time she was under my observation. The compressing medium might be assumed to involve the trunk of the nerve, the complex of the primitive fibres, because the entire distribution, as far as it could be tested, was deprived of sensation. It was evident, from the presence of sensibility in the range of the first and second branches, and from the absence of other characteristic symptoms, that the seat of the compression could not occupy the Casserian ganglion, where the third branch comes into close relation with the first and second. I was as little justified in assuming the compression to be exerted upon the nerve after its issue from the foramen ovale, because at this portion, the fibres of the portio minor are so closely united to the sensory filaments, that pressure must necessarily have paralysed both at once, and this was proved not to be the case, by the normal state of the movements of mastications on the left side of the face. I therefore felt satisfied, that the third branch of the fifth pair was compressed in its course through the cranium, anterior to the foramen ovale; and that there was a tumefaction of the dura mater, or the bone, of limited extent, as the adjoining portio minor was not involved in the paralysis.

The patient died on the 19th of March, 1838, of dropsy; and the corpse was brought to the dissecting room, where, in the presence of Professors Müller, Henle, and Schwann, and Dr. Philipp, before the body was opened, I again explained my diagnosis, and the grounds upon which it had been formed. Professor Henle, with his accustomed care, examined the contents of the cranial cavity, and obtained the following results:

The surface of the cerebrum was covered with gelatinous exudation, which here and there was white and opaque. At the interior surface of the posterior lobe of the left hemisphere, an almost circular spot, of about one inch in diameter, corresponding to the posterior horn of the lateral ventricle, was softened, but without presenting any vascular congestion in the vicinity. The brain and medulla oblongata were otherwise healthy. The third branch of the fifth nerve of the left side, at the point where it passes into the foramen ovale, was surrounded at its external surface, with a reddish vascular membrane, consisting partly of fibres, and partly of very small watery vesicles. On more minute examination, it proved to be an exudation of the neurilemma; towards the cranial cavity, it gradually passed into the tissue of the dura mater; on the other side it passed into the normal neurilemma. The neurilemma was thickened and reddened in the entire passage of the nerve through the sphenoid bone; and also a little beyond it to the point at which the otic ganglion lies. The nerve appeared tumid, so far as the neurilemma was altered; it was yellowish, and perhaps somewhat harder than in the rest of its course. The portion of the third branch derived from the ganglion Casseri, alone participated in this alteration;

the motor root passed uninjured along the inner side, and only joined with the larger portion below the diseased portion. All the nerves supplying the pterygoid and buccinator muscles, the temples, the tongue, and the lower jaw, were perfectly healthy, as also the third branch of the fifth on the right, and the glosso-pharyngeus on either side.

4. A remarkable case, which occurred in the Clinical wards of Professor Blasius, of Halle, and has been described in the dissertation of Dr. Franz von Meyer, in his 'Dissertatio inauguralis sistens paralyseos nervi trigemini casum.' (Jena, 1847.) It is as follows:

A female, who was in the seventh month of pregnancy, was wounded by a pistol shot on the right side of the neck. A few days after, anæsthesia of the right half of the face ensued; there was paralysis of the muscles of mastication, and inflammation of the eye, which left a large cicatrix in the cornea. The wound of the neck healed, and the patient was enabled to resume her domestic occupation. Four weeks later, she was attacked with paraplegia. Parturition ensued, and presented no difficulty. On her admission into the hospital, she presented the following symptoms: there was disease of the cervical vertebræ, the neck was immovable, the head could only be moved very slightly and with great pain; the head was inclined to the left side, so that the chin rested upon the left clavicle. The left arm and leg were paralysed, and there was anæsthesia of the right half of the face and their cavities. The front of the right half of the tongue was insensible, whilst the root of the tongue retained its sensibility, and vomiting ensued if it was touched. There was entire loss of taste at the tip and middle of the right half of the tongue; the patient could taste sugar, acetic acid, ink, or rhubarb, placed on the front of the left half of the tongue, but the right side was entirely unable to receive sapid impressions. As the mouth could not be properly opened, the experiments could not be instituted, upon the right side of the back of the tongue, with sufficient accuracy; rhubarb was the only thing distinctly tasted.

The muscles of mastication on the left side of the face were paralysed; the movements of expression continued uninterrupted. On the right eye there was a large cicatrix on the cornea; the iris was unaltered, the pupil contracted but moveable. The gums of the right side were in a condition of scorbutic softening, blood was frequently discharged from the right nostril, and the mucous membrane was excoriated. The capillary vessels of the right cheek continued congested up to the period of death. The temperature of the right cheek and infraorbital region remained to the last 1—1½° R. (2¼°—3° F.) warmer than the left side. The secretions of the eye, nose, and oral cavity remained unimpaired; equally so the nerves of the special senses. The patient was unable to turn the eye outwards. Deglutition was painful and laborious; opening the mouth and putting out the tongue was troublesome; the sound of the voice weak. Subsequently alvine incontinence alternated with retention of urine. Gangrenous decubitus ensued with a sensation of cords round the epigastrium. Formication and pain in the right infraorbital region. Towards the end of the fourth month after the injury, some alterations occurred in the nervous symptoms; a slight contractility returned in the muscles of mastication, with trifling sensibility in the right half of the face. The sphincters commenced to resume their office; the paresis of the upper extremities diminished, but rapid suppuration occurred in the right lung, with colliquative diarrhœa, which caused death in the seventh month after the wound had been inflicted.

In the post-mortem examination the track of the ball, which was indicated by black pigment, was the first object of attention. It lay on the right side between the muscles of the neck under the large horn of the os hyoides, in the direction of the glottis; a portion of the edge of the latter was torn off, and cicatricial bands, the remains of the closed wound, were found at the base of the rima glottidis. The posterior wall of the pharynx was perforated at the point at which it is attached to the second cervical vertebra. The hole, of the size of a pistol bullet, was seated an inch and a half under the Eustachian tube, and led into a carious excavation of the body of the vertebra, posteriorly bounded by the dura mater of the spinal cord. No further trace of the wound was to be discovered from this point. The lower six cervical vertebræ, and the two upper thoracic vertebræ, were carious. In the middle of the bodies of the vertebræ the caries extended to the fifth cervical vertebra, and then divided into a right and left furrow, between which the bone was healthy. By pursuing the course of these sinuses, a vomica in the right lung, of the size of a man's fist, was reached, occupying the entire upper lobe. An abscess of the size of a walnut was found in the left lung; there was no trace of tubercle anywhere. The dura mater of the spinal canal at the atlas was intimately adherent to the arachnoid, and also from the second cervical to the first dorsal vertebræ. At the anterior portion of the right os petrosum, the bullet was found lying close to the ganglion petrosum enclosed in a cyst, and adhering to the petrous bone by a piece of grey fibrous tissue. The two divisions of the right trigeminus, as well as the ganglion Casseri, were reduced in size; the three branches and the abducens were softened, and of a yellow tinge; the same was the case with the middle lobe of the cerebrum. The remaining cerebral nerves, especially the oculomotor, the facial, and glosso-pharyngeal, were normal. The summit of the pyramid of the petrous bone was carious in the vicinity of the carotic canal. The foramen lacerum anterius was surrounded by caries, and there were also erosions and irregularities in the sella turcica.

On the other hand we are not without observations which testify against the assumption that the lingual branch of the trigeminus is the nerve of the sense of taste. Dr. Stamm reports one of this kind, with the post-mortem account, in the 'Heidelberg Medicinische Annalen.'[1] A man, aged 50, complained in October, 1837, of a trifling pain at the upper part of the neck at the right side of the fauces, which was chiefly perceptible when he swallowed his saliva. The right nostril gradually became impervious to air; intermittent pains in the right temple and cheek supervened, which yielded to the exhibition of quinine whenever they presented a regular tertian type. The pains disappeared in the temporal region, but extended in the right cheek, from the lower eyelid inclusive to the right half of the upper lip and nose; the paroxysms frequently presenting a tertian type. The levator palpebræ superioris and the external rectus of the right side became paralysed. The pains ceased and yielded to anæsthesia. The superficial integuments, the conjunctiva of the right lower eyelid, the right half of the nose and upper lip, externally and internally, the portion of the right cheek enclosed by the nose, and a line drawn from the right angle of the mouth to the outer angle of the eye, could be punctured deeply, so as to draw blood, without being felt by the patient. The passage of air through the left nostril now became interrupted. Ocular inspection showed above and behind the soft palate, which was somewhat depressed, a hard nodulated tumour, which rapidly increased in size, and rendered deglutition so difficult, that the patient was able to swallow nothing but liquids, and these only with danger of suffocation. The hard palate sunk deep down into the cavity of the mouth. About this time new pains occurred in the right half of the mouth, in the right half of the lower jaw, and the teeth, and especially in the right half of the tongue. These occasionally presented a tertian type, and yielded to quinine; a few days after the inner surface of the right cheek, the gums of the upper and lower jaw, the corresponding half of the hard and soft palates, the nether lip, and the tongue, also proved to be completely insensible to pricks with a needle. At the same time the faculty of taste continued; when the tongue was stretched out and a strong bitter applied to the edge, the patient tasted it; this experiment was repeated several times. The sense of taste was more vivid on the left side of the tongue. The mucous membrane of the right side of the mouth was shining and dry from the commencement of the anæsthesia, while the left side was moist. There was no paralysis of the muscles of mastication or expression. From time to time dark, and occasionally fetid, blood was discharged from the mouth and nose. The patient now remained free from pain, but fell into a state of sopor, which ceased after the hard palate gave way, and allowed the discharge of a sanious ichor. The movements of the levator palpebræ superioris had been restored previously. The patient was able to respire better by the nose, and to swallow liquids. A week after he died.—*Sectio cadaveris:* The base of the cranium immediately behind the sella turcica was perforated to the extent of a fourpenny piece, the body of the sphenoid bone had almost entirely disappeared, the anterior lip of the petrous portion of the right temporal bone was also destroyed, and the osseous tissue immediately surrounding the orifice, was of an ashy-grey colour, very porous and friable. On the right wing of the sphenoid bone, immediately over the foramen rotundum, extending outwards three quarters of an inch in length, there was a pale, red, firm, tuberous mass, from 1½ to 2½ lines thick; with this tumour the fifth nerve, at the point where its ganglion divides into three branches, was so intimately adherent, that it was impossible to detach the nerve from the surrounding mass by dissection. It was only near where the ophthalmic branch is given off, and near the origin of the third division, that nerve tissue could be traced. The oculomotor and abducens nerves showed their normal structure shortly before entering the upper fissure of the orbit. Mere traces of the right pterygoid process and the right hard palate remained. The hard palate presented a central perforation. The same diseased mass which exhibited all the characters of scirrhus, was attached to the posterior surface of the fauces; forming separate tubers with an ash-grey and ulcerated surface. The right tonsil was converted into a yellow brawny mass.

---

[1] Vol. i, p. 70.

Dr. Bérard has published a case of no less importance in the 'Gazette Médicale de Paris.'[1] A man, aged 64, attempted suicide by firing a pistol into his right ear; and as this did not destroy his consciousness, he fired a second shot at his forehead, but the bullet only injured the soft parts, and came out at some distance from the point at which it entered. On examination the petrous bone proved to be fractured, blood was discharged from the ear mingled with small debris of cerebral matter. The patient remained conscious, complained of excessive pains in the head, coldness, nausea, and vomiting. The cutaneous surface was pale and cold; the pulse small and retarded; and his features distorted by a complete paralysis of the right half of the face. The external muscle of the eye of this side was paralysed, for which reason, whenever the left eye moved towards the nose, there were strabismus and double vision. The entire right side of the face and its cavities, and of the head to the vertex, were deprived of sensation. The patient himself had an impression of the skin being swollen; and when he drank he approached the glass close to the right half of the lips with his hand, as he believed that the impediment was produced by their tumefaction. Vision and smell were normal. The movements of the tongue had not suffered in the least, though its right half as well as the inner surface of the cheek, the hard and soft palate, and the tonsil of the right side, were deprived of sensation. The sense of taste was unaffected; when sugared water, vinegar, and other liquids were dropped upon the right half of the tongue near its margin, the patient invariably stated correctly what the substance was. After the eighth day his condition became more alarming; restlessness, delirium, paralysis of the left arm and leg, supervened, and on the tenth day death ensued.

---

[1] No. 30, August, 1840, p. 490.

On dissection the pars petrosa of the right temporal bone was found broken up into splinters. The fifth nerve of this side was congested, and so much softened, that it was easily torn at the upper surface of the petrous bone. The serous fluid which ordinarily surrounds it at this spot was absent. The ganglion Casseri participated in the congestion and softening. The branches of the fifth were normal, the second only was somewhat congested. The abducens was somewhat reddened, and softer than the same nerve of the opposite side, in the neighbourhood of the posterior clinoid process. The facial nerve was entirely destroyed where it passes through the aqueduct of Fallopius. In the lower portion of the middle lobe of the right hemisphere, where it lies upon the petrous bone, a loss of substance was perceptible, leading to a cavity of the size of a small egg, containing pus, softened portions of cerebral tissue, and the bullet. The cerebral tissue in the vicinity was red, congested, softened, and infiltrated with pus.

Burrows, Noble,[1] Vogt,[2] also gave instances, though unaccompanied by post-mortem verification, of anæsthesia of one trigeminus, accompanied by an entire loss of sensation in the corresponding half of the tongue, without the taste being involved. I have lately met with a similar case myself. The patient, a woman aged 57, labours under an attack of anæsthesia of the fifth nerve of the left side. The surface of the face and its cavities are insensible to external injury and to every change of temperature. The left bulb, the pupil of which presents the same diameter as that of the right, suffers the pricking of a pin; the vessels of the conjunctiva certainly at once become congested, but neither blinking nor tears ensue. When a piece of ice is placed upon the eye the patient is ignorant of the temperature. If ammonia is applied to the left nostril, or if it be tickled and irritated with a notched quill feather, or pungent snuff introduced, neither sensation nor reflex action—in the shape of sneezing—occurs. The left half of the tongue, as well as the mucous membrane of the left side of the oral cavity, have lost their sensibility. Powdered colocynth or sulphate of quinine applied to the front and middle part of the tongue, are not tasted so long as the member is protruded from the mouth; but the taste becomes perceptible as soon as it is drawn into the mouth. I repeated this experiment on the following day, by ordering the patient to put out her tongue, and touching the root with the bitter substances. Taste manifested itself as vividly on the left as on the right side.

---

[1] Valentin, loc. cit., p. 44.

[2] Müller's Archiv, 1840, p. 72.

I did not make the experiment in the previous case in this manner, but was satisfied to find taste deficient in the anterior and middle portion of the affected half of the tongue, and must therefore admit that its conclusions, with regard to ageustia, are incomplete. The statements of other authors must be estimated in the same way, as their experiments were not carried out with a due regard to all sources of fallacy. We must except the case related by Dr. Rigler (p. 218), who states expressly that the sense of taste was lost to the anterior and middle portion of the left half of the tongue, but that the whole root of the organ continued in the entire possession of its faculty of taste.

There is another circumstance which also appears to me to subvert the opinion that the lingual branch of the fifth pair is the medium of sensation and taste, viz. the absence of imaginary taste in hyperæsthesia of the lingual nerve. The patient spoken of at page 37, affected with tic douloureux, never lost his sense of taste, however frequently the torturing pains occurred.

If we compare these negative arguments with those of a positive character, deduced by Valentin, with extreme accuracy, from anatomical and physiological data, the assumption that the glosso-pharyngeus is the nerve of taste appears the most probable, although we are not as yet provided with pathological proofs. Among the facts quoted, those of Horn and Picht are particularly important; they are to the effect that the application of acids to the papillæ vallatæ does not excite a sour but a bitter taste.[1]

---

[1] Loc. cit., pp. 41, 45, 117.

The influence of sensation upon the special sense, which was so palpably manifested in the case of the patient affected with anæsthesia of the inferior maxillary branch of the trigeminus, is not opposed to this, for the sense of taste is the one in which the sympathetic action of sensitive and sensual nerves is most vivid, so that it is often a matter of difficulty to analyse the impression into its constituents of sensation and taste.

We must here allude to a peculiar modification of taste, nausea. This sensation differs from other gustatory impressions in this, that it may be excited by the mere mechanical irritation of those parts to which fibres of the glosso-pharyngeus are distributed. If the finger is carried along the tip, the edge, or middle of the tongue, it merely induces the ordinary sensation; but the instant the root of the tongue, the papillæ vallatæ, or the velum palati are approached, the sensation of nausea is induced, followed by the reflex action of retching. This action renders the glosso-pharyngeus the guardian and protector of the digestive apparatus; in the same way as the laryngeus superior watches over the entrance to the respiratory organs. The hyperæsthetic state of nausea is not unfrequently associated with other morbid conditions, as hysteria or hypochondriasis, and occasionally also with organic affections of the brain; whilst anæsthesia is marked by the absence of nausea under circumstances likely to give rise to it.

CHAPTER XXVII.

ANÆSTHESIA OF THE SYMPATHETIC GANGLIA AND THEIR NERVES.

We must at once confess to an utter ignorance of these conditions; they have not even been mentioned until now, and their investigation is connected with great difficulties. We have already pointed out, that impressions made upon the sympathetic system are not generally conveyed to the brain; it is only when the irritation is powerful, and in hyperæsthesia, that the individual becomes conscious of them; the loss of the conducting power can therefore only be inferred from the cessation of pain or other sensations, while the cause continues to operate, as in gangrene of the intestine; but even this would be unsatisfactory. On the other hand, the conducting power of the sympathetic is chiefly of a reflex character, inducing movements, whose cessation would be an immediate consequence of anæsthesia occurring in this system. An instance of this is afforded in loss of motion of the intestine or the secretory ducts, and even of muscles that are under the influence of the cerebro-spinal system; forming a contrast to the extravagant reflex action which accompanies hyperæsthesia of the sympathetic. This subject will be treated of in detail in the chapter on Reflex Paralysis, in the concluding portion of the work, to which we refer the reader.

CHAPTER XXVIII.

ANÆSTHESIA OF THE SPINAL CORD.

THE phenomena vary according to whether the spinal cord is affected as the conductor of the brain, the medium of conscious sensations, or as the centre of reflex action.

The posterior strands of the cord serve for conduction, as proved by experiments made on living animals; those of Longet[1] deserve to be particularly mentioned, on account of the great accuracy with which he performed them. After dividing the spinal cord, the portion of the posterior tracts, which lies below the incision, is insensible to all mechanical, chemical or electric irritation, whilst the part above the incision shows that it has not lost its susceptibility to these influences by the violent pains they induce. The anæsthetic influence of æther and chloroform has afforded these experiments still greater probative weight, inasmuch as the posterior portions of the cord may be irritated throughout their entire extent in etherised animals, without producing the slightest effect.

Surgical injuries, which in man display the disturbances of functions within more narrow and accurately defined boundaries than is generally the case in disease, are rarely accompanied by exclusive anæsthesia of the spinal cord. But few observations of this kind are on record, and they are not confirmed by post-mortem examinations. Thus Boyer relates the history of a soldier, who was wounded at the upper and back part of the right side of the neck by a sword thrown at him, and was attacked with paralysis of the right arm and weakness of the right leg, the sensibility continuing unimpaired. The affection of the leg disappeared after a few days, that of the arm continued. The extremities of the left side retained their motility, but had lost their cutaneous sensibility. The left side of the thorax, the abdomen, the penis, and the scrotum, were insendull pricking sensation at the tip of the thumb and the first and second finger. Whenever the patient made an attempt at writing, the pricking extended up the forearm, and combined itself with jerking contractions of the hand and forearm muscles, which prevented the continuance of writing. Considerable sedimentation in the urine, and copious acid perspirations proved the continuance of the rheumatic diasthesis. Frictions of the arm with the oleum terebinthinæ æthereum, and a course of twenty-four Russian baths, with the application of the cold douche to the affected extremity, restored the patient to perfect health.

---

[1] Recherches Expérimentales et Pathologiques sur les propriétés et les Fonctions des Faisceaux de la Moëlle Epinière et des racines des Nerfs Rachidiens; Paris, 1841.

In the writer's cramp it is characteristic that the movements of the fingers preserve their integrity with regard to every other species of occupation; although we must not overlook a case described by Stromeyer,[1] in which an attempt to play on the pianoforte caused the thumb, with the second phalanx completely flexed, to be immediately drawn under the hand. I may remark that cramps of the fingers in other occupations have not met with the attention they deserve. Some time ago a smith, aged 37, came under my notice, who applied for relief at the hospital, for a rigid contraction of the muscles of the forearm, occurring whenever he took hold of the handle of his hammer, and wanted to fetch a blow; it was accompanied with violent pain, and the tense muscles were said to project like cords under the skin. This cramp had prevented him from attending to his business for the previous six months. All the other movements of the arm were unimpaired, nor did the motor or sensory functions of the arm show any other deviation from the normal standard. A violent concussion of the arm was stated to have given rise to the complaint in the first instance. The most energetic remedies, and at last the continued application of electro-magnetism produced no effect, so that the patient was forced to abandon his trade, and to occupy himself with painting doors and windows, the handling of the brush not causing any inconvenience.

It would appear from the above, that the peculiar position of the fingers in certain manual occupations, itself initiated with ease by an effort of the mind, and even maintained for a while, acts by reflex irritation, and destroys the co-ordination of the nerves and the association of the muscles, by a spasm. In the first edition of this book, I assumed that other influences, such as the quality of the paper or of the pen, might operate in the production of the writer's cramp; the following observation proves that this is not the case. A boy of 8 years had for six months been affected with a convulsive extension of the fingers of the right hand, rendering the hand so stiff that it could not be bent. The paroxysms were accompanied by a pricking sensation extending upwards to the elbow, and they recurred from five to eight times daily, and lasted several minutes each time. The left arm was subsequently affected in the same manner, and after this epilepsy was fully developed, the approach of which affection had been predicted the first time the boy was presented to the students, the spasm being viewed as an aura. Among the exciting causes none brought on the paroxysms so frequently as an attempt at writing; a rigid contraction of the muscles of the thumb at once ensued, by which the limb was crossed over the hollow of the hand. The contact of the pen had no influence, for the same phenomenon occurred when the boy, without taking hold of a pen, placed his fingers in the position necessary for writing, whether he rested his hand on the paper or figured the letters in the air.

---

[1] Ueber den Schreibekrampf, in—Medicinisches Correspondenzblatt Baierischer Aerzte, 1840, No. 8, p. 117.

In speaking of this obscure affection we may also allude to the fact that some persons are liable to feel slight shocks, resembling electric discharges, in their fingers while they are writing. Professor Müller[1] states that at a time when he was suffering under nervous irritation, he frequently presented this symptom whenever he had over-exerted his hand and fingers.

The *treatment* hitherto pursued, both local and general, has been invariably ineffectual, so that the patients generally ceased from all attempts at cure, and remained satisfied with mechanical contrivances, the object of which was more or less to cause a pressure upon the skin and the subjacent muscles. Stromeyer[2] also applied the principle of division of the muscles to the cure of the writer's cramp, and in one case a brilliant result justified the antispasmodic reputation of tenotomy. As early as the fourteenth day after the subcutaneous division of the tendon of the flexor longus pollicis, the patient was perfectly able to resume his pianoforte playing, and to write. On the other hand it is to be observed that the operation was perfectly ineffectual in several patients upon whom Dieffenbach operated.

---

[1] Elements of Physiology, Dr. Baly's Translation, vol. i, p. 640.

[2] Loc. cit., p. 118.

After amputation or fracture the injured limb (an arm or a leg) is occasionally attacked with spasms, which are either caused by direct injury of the motor nerve, or by reflex action. Thus Dr. Babington[1] relates the case of a woman, aged 20, whose right arm was amputated on account of scrofulous disorganisation of the elbow-joint. Three months later she complained of the stump starting up in her sleep; it soon began to move constantly to and fro, in alternate abduction and adduction. While the patient slept, the movement was limited to a mere tremor. The treatment was ineffectual.

---

[1] Guy's Hospital Reports, vol. vi, p. 423.

CHAPTER IX.

SPASM IN THE RANGE OF THE MOTOR NERVES OF THE INFERIOR EXTREMITIES.

The seat and cause of the affection induce various modifications in the phenomena accompanying it.

Among the muscular nerves of the thigh, the branches of the first and second lumbar nerves, which are distributed to the flexors, the psoas and iliacus, are the more frequent seat of the spasm, and cause the spasmodic contraction of the hip, the diagnosis of which disease has been determined by Stromeyer's investigation. The extremity is bent at the hip-joint, and is incapable of being extended. Attempts at extension excite violent pains in the knee. The tendons of the psoas and iliacus, and the muscles themselves, project in dense ridges; touching them increases the pain in the knee. The hip is drawn up by the action of the quadratus lumborum and the abdominal muscles, so as to induce an apparent shortening of the extremity, from the tip of the affected foot only touching the ground in walking.

Spasm rarely attacks the muscles that move the leg, and cause extension or flexion of the knee; but it is frequently seated in those filaments of the sciatic nerve which supply the triceps extensor cruris, and sometimes also in those of the tibialis muscle, with or without an alteration in the form of the foot. In the former case, pes equinus or varus is produced, the spasmodic character of which is most distinctly manifested when the club-foot occurs periodically under certain conditions. A few cases of this kind are contained in the works of Stromeyer and Dieffenbach, and possess too great importance in reference to pathology not to be detailed here. A man, aged 30, had been affected with club-foot shortly after he first learned to walk, without any appreciable cause; in walking he only rested upon the outer edge; but when he sat, the foot could be almost reduced to the normal position, even when the knee was stretched, but still more easily when it was bent. As soon as he attempted to step, the sole of the foot was turned inwards, and violent pain ensued. In a child of a year and a half, the right foot in walking took the shape of pes equinus, while in sitting and lying no deformity whatever could be discovered. The pointing of the foot showed itself in the first attempts at walking.[1] A robust youth of 15, one day mounted upon a table to set the clock; on jumping off backwards on to the ground, the toes came first in contact with the floor, and he at once experienced a sharp pain in the heel, so that he could no longer use the foot. Frictions with oil relieved the pain after a few days, but on again attempting to walk, only the toes touched the ground; the heel was drawn up two inches, and even the entire weight of the body was insufficient to press down the heel. While sitting, the young man could place his foot in any position he chose; and this, as appeared at first, only because in bending the knee joint, the calf was relaxed and elongated. But on close examination, a different rationale was discovered. When the patient lay on his back, so that the knee joint and the muscles of the calf were relaxed, he was able to effect every movement with the metatarsal joint; to extend, adduct or abduct the foot. It is consequently a matter of physiological interest to observe, that when the gastrocnemii were inactive, they could be extended by the flexors; and that, in the erect posture, the gastrocnemii, notwithstanding the weight of the body resting upon the foot, were shortened as much as two inches. Mr. von J., aged 22, a student of philosophy, robust and in florid health, was attacked in his early youth with a debility of the lower extremities, rendering locomotion difficult. Strengthening baths and spirituous lotions were the remedies employed at the time. The examination of the extremities showed no difference either as to form or nutrition. In the sitting posture both feet were perfectly well formed, and the young man was able to make any movement with facility; but if he rose and walked, his gait was insecure, tottering and waddling, resembling the movements of a person upon polished ice with smooth boots. His walk became more irregular when he took off his boots and stockings, and walked barefoot through the room; he was then often obliged to support himself, to prevent his falling. If he placed his feet on the ground, their form was normal; but, as soon as he rose from his chair, and the feet had to bear the weight of the body, they instantly assumed the shape of splay feet, the arch of the sole disappeared, the toes contracted, and were raised with the front of the foot, so that the dorsum of the foot presented a concavity.[1]

---

[1] Stromeyer; loc. cit., pp. 83 and 95.

[2] Dieffenbach; Ueber die Durchschneidung der Sehnen und Muskeln, p. 225.

Spasm of the muscles of the calf occurs more frequently without alteration of the shape of the foot; it results from irritation of the sciatic nerve, and is accompanied by intense pain.

Peripheral, as well as reflex, irritation may induce the complaint. Morbid processes of the vertebræ, especially of the lumbar region, are not unfrequent causes of the former class, and they give rise to contraction of the hip-joint, in the same way as disease of the cervical vertebræ originates the caput obstipum. The abdominal organs may also implicate the lumbar and sacral plexuses directly, an instance of which is afforded by the pregnant uterus. Their influence is, however, more frequently one of a reflex character; thus spasm of the muscles of the calves is associated with dysentery, and the coincident occurrence of spasm in the extensors of the fingers is a further evidence of its being due to reflex irritation. Intestinal irritants of a different kind may operate in an analogous manner. We must not overlook the irritation proceeding from the womb. The hysterical affections of the joints described by Brodie[2] may probably be referred to this source. Thus Andral relates the case of a girl, of 19 years, whose menstrual period was suddenly arrested by a fright, and was afterwards affected regularly, at the time at which the menses should have appeared, with spasmodic contraction of the inferior extremities. The leg was flexed to such a degree that the heels touched the nates. During the intervals her health was undisturbed, and on the restoration of her courses the convulsions ceased. The cases of periodic club-foot which have been related, direct the attention to the skin. This generally, and especially the cutaneous coverings of the sole, must be looked upon as a great source of reflex irritation:

---

[1] Dieffenbach; loc. cit., p. 240.

[2] See pp. 64 and 74.

the mere contact of the sole with the ground, particularly when bared, is found to excite an attack of spasm. Brodie[1] has often observed that in the hysterical affections of the joints, to which he has drawn attention, a gentle touch of the cutaneous coverings induced convulsive movements of the leg, which at times became so violent, as to throw up the thigh, and occasionally to resemble chorea. Twitchings and contractions of the muscles of the lower extremities are occasionally met with as symptoms of centric disease of the spinal cord, though not so frequently as paralysis.

Our treatment is often crowned with brilliant results if we attend to the course. Such is the case in spasmodic contraction of the hip-joint, dependent upon a disease of the osseous tissue of the lumbar vertebræ. The accurate examination of the spine will prevent this error, and direct the application of derivatives (issues and inunction, with tartar emetic) to the proper locality. Removing the intestinal and uterine irritation affords permanent relief to the cramps of the calves. In spasmodic clubfoot the treatment formerly adopted was of no avail. In the cases above quoted cures were obtained by tenotomy and myotomy.

Among the spasmodic affections of the extremities there is one which has attracted some attention in modern times, and, from attacking both hands and feet, has been termed carpopedal convulsion. It is met with mainly during the first three years of life. The fingers are bent across the hollow of the hand, with the thumb underneath them; the latter is rarely affected alone; at times the entire hand is flexed inwards. An attempt at extension creates pain. In some cases a trifling tumefaction and reddening of the hand and the fingers has been observed. The feet suffer in a like manner, but only in company with the fingers, and not by themselves. The toes are doubled inwards, the big toe being generally abducted and the foot rigidly extended. The spasm occurs periodically, or is persistent for days and weeks. There are no other symptoms of an affection of the brain or spinal cord, a circumstance which has induced some modern French writers to look upon it as an idiopathic contraction of the muscles.

This spasm generally accompanies other and especially intestinal affections, from which it originates by reflex irritation. Thus it also occurs during dentition, by itself or associated with spasm of the glottis.

---

[1] Lectures illustrative of certain Local Affections, p. 43.

The *prognosis* is favorable as to the issues of those spasmodic affections which are unconnected with cerebral disease; those of cerebral origin are generally unilateral. The *treatment* must differ accordingly; the fundamental disease must be attended to, and only when this has ceased, and the spasm still continues, anti-spasmodics, asafœtida, baths containing an infusion of valerian, should be employed. Whoever in such cases has recourse to abstracting blood, blisters, and debilitating remedies, must be held responsible for the injury which will ensue.

vessels, though dependent upon nervous stimulation, play a subordinate part in the theory of these neuroses.

The inherent force of the muscular fibre, contractility, is excited by the nervous stimulus, and the stimulus of the arterial blood. The nervous stimulus is the more powerful of the two, and manifests itself even after the sanguineous stimulus has ceased. Frogs move, hop, and jump about for half an hour, and move after the heart has been removed; human beings who are labouring under cholera asphyxia, even execute movements. I have seen patients come to my hospital on foot, stand, walk about, rise up in bed, and move their arms, when the pulse had entirely ceased, so that when an artery of a limb was opened during life, instead of a wave of blood issuing, a mere thin fibrinous concretion appeared. But this capability of motion only endures a short time, and is extinguished with as much certainty as if the conducting power of the motor nerve had been interrupted; we see this occurring in arteritis, unless the arterial blood be supplied by the collateral circulation.

The physiological laws regulating the nerves which excite the contractility, must serve the doctrine of the neuroses of mobility as a basis. We call to mind that, from whatever source the stimulus may come, it can only reach the muscle by the course of the motor nerve. The sensory nervous fibre does not directly excite contractility, whether mechanical, chemical, or electric irritation be applied, and in whatever degree—the only condition is the isolation of the nerve; the fact is sufficiently proved by experiments made upon the infraorbital and lingual nerves. Again, the law of isolated and centrifugal conduction, which applies to the peripheral distribution of motor nerves, is of extreme importance. In obedience to the first of these laws, the motor energy is exalted or extinguished in that nerve-fibre only which is affected by the irritating or obstructing influences, without implication of adjoining fibres, however closely approximated; in accordance with the second, owing to the centrifugal tendency of the motor agent, the effect is not propagated upwards to the nerve-fibres passing off above the affected part. On the other hand, the central organs possess the power of communication, the motor irradiation, as their attribute, impulses being communicated both from sensory larynx of a recently killed horse, and observed that the muscle at once contracted, and the glottis was narrowed by the approximation of the arytenoid cartilages.

The spasmodic movements of respiration occur either in isolated acts, or associated in groups. The spasm of the glottis and bronchial spasm are the representatives of the former class.

SPASMUS GLOTTIDIS.

Asthma laryngeum.

Contraction of the muscles closing the rima glottidis causes an impediment to, or entirely arrests inspiration. There is no disease or injury of the larynx with which this affection may not be associated. As an idiopathic affection, which mainly occurs in early infancy, though not unknown to older authors, it has recently been described under various denominations, as asthma acutum Millari, asthma thymicum, spasmodic croup, laryngismus stridulus; we, however, prefer the name which heads this paragraph, as the most simple. Spasm of the glottis occurs in paroxysms of varying intensity, according as the glottis is partially or entirely closed. The milder attacks are characterised by a short attack of dyspnœa, difficult and often sonorous inspiration, as in apnœa, accompanied by restlessness and an anxious expression of the face; such attacks are at first often unnoticed, as the health of the child does not appear affected in the intervals. A trifling mucous rattle in the larynx sometimes precedes. In the more violent paroxysms the apnœa approaches to suffocation, and the respiration is interrupted for seconds, and even for one and two minutes. The eyes are wide open and staring, the face becomes livid or cadaverous, the alæ nasi and the muscles of the neck act violently, the arms are stretched out and rigid, asphyxia appears unavoidable when at last the air penetrates in jerks and with a sonorous tone, and the paroxysm closes with a fit of crying and sobbing. During its continuance the spasmodic contractions of the head and feet often occur, of which we have spoken at page 328; in a few instances they continue during the intermissions, or they alternate with the spasm of the glottis. The same applies to the general convulsions, which occasionally precede the outbreak of this affection. This was the case in a girl of fifteen months, who, in the month of February in 1846, was under my care as an out-patient of the hospital; some weeks previously it had passed through several attacks of eclampsia, which had left contractions of the upper and lower extremities. The forearm was bent upon the upper arm, and the leg upon the thigh, so that forcible extension was impossible; consciousness remained unimpaired. The contractions lasted four days, and then disappeared spontaneously. They were followed by attacks of spasm of the glottis, alternating with eclampsia. Small doses of calomel with rhubarb, baths, and enemata of asafœtida, produced a temporary alleviation of the symptoms. In March and June the same phenomena recurred with increased violence; then ceased until December, when the spasm and the eclampsia again alternated. The circumstance that an eruption of impetigo capitis during the summer had diminished the attacks, and the spontaneous disappearance of the cutaneous affections had been accompanied by a return of the convulsions, was used as a therapeutic indication, and the Unguent. Antimonii Tartarisati rubbed in partially in the hairy scalp. Since this time the spasms have not returned, and the child has grown up strong and healthy.

The attacks of spasm of the glottis occur more frequently by night, and on awaking from sleep, than by day. Sucking, deglutition, straining in defecation, a sudden movement, often produce them instantaneously. At times the reflex irritability is generally exalted; a slight touch or noise causing a start and the fit. Of the accompanying symptoms those of derangement of the digestive organs are the most frequent, such as constipation, an abnormal greyish yellow colour of the fæces, resembling putty, rarely diarrhœa, and accumulation of gases in the intestines.

The duration of the disease extends over several weeks and months, with intermissions of shorter or longer duration. It is only in very rare cases that recovery or death takes place during the first days of the illness. Among the predisposing causes, the first period of dentition exerts the greater influence. There are instances on record of its affecting children during the first few weeks of life; thus one of my own children was attacked with violent spasm of the glottis on the second day after birth, but it only occurred in a single paroxysm, and did not return. Others have observed it in the third and fourth year, but these are exceptions, the chief proclivity being manifested from the sixth to the fourteenth month. There can be no doubt of the existence of an hereditary predisposition; in many families several, and even all, the children, though they may have been differently brought up, both as to residence and food, are attacked with spasm of the glottis. In one family I attended two children who laboured under this complaint, (one of whom died,) after three other children of the same family had fallen victims to it. Reid[1] mentions one family of thirteen children, only one of whom escaped, and four died. The soil and the atmosphere exert some influence upon the origin of the complaint; thus it occurs more frequently in towns than in the country, and some towns, as London and Hamburg, are remarkable for the greater frequency of its occurrence than others, *e. g.*, Paris. Children brought up by hand appear to suffer more frequently than children who have been nursed at the breast. Weaning appears to favour the development and continuation of the disease. It may terminate in three ways: 1, in recovery, which is generally gradual; 2, in immediate death by asphyxia, the most violent efforts to breathe are fruitless, the head is bent backwards, the trunk is in a tetanic condition, and suddenly the child collapses, and has ceased to exist; 3, indirectly, in death by general convulsions and sopor.

The post-mortem examinations coincide as to the integrity of the larynx and trachea; as well as with regard to the changes induced by the asphyxia, consisting in congestion of the lungs, in the right side of the heart, and in the brain.

The paroxysmal character of the affection, and the calmness of the respiration during the fore intervals, suffice to distinguish it from croup and diphtheritic disease of the larynx. In the former there is no fever, and the voice is unaltered. Cough, the constant accompaniment of croup, is not observed during the attacks of spasm of the glottis, and is an accidental occurrence during the intermissions. Cramp of the toes and fingers are not seen as sequelæ of croup. In this disease the

---

[1] James Reid, on Infantile Laryngismus; London, 1849, p. 19.

The cycle of the spasmodic labour-pains is different from that occurring in normal labour; the pain attains its climax suddenly, at which it remains for a considerable time, and then subsides quickly. The contraction of the uterus is effected partially and irregularly. In intestinal spasms the waves of the movement very often recede and cause anti-peristaltic action. The organs possessed of a sphincter are not unfrequently attacked with spasm, in which the normal antagonism to their contractions is removed; thus we find a desire to micturate in combination with ischuria, and tenesmus associated with a desire for defecation.

The relation of the stimulus to the excitement varies in the sphere of motility according as the stimulus acts upon the peripheral tracts or the central organs. In the cerebro-spinal nerves the excitement is of equal duration with the irritation; the spasm in the muscles commences coincidently with the introduction of the galvanic current, and ceases at the moment at which it is interrupted. Those muscles alone are shortened whose nerve-fibres are distributed below the point of irritation. When the ganglia and nerves of the sympathetic are irritated the effect is generally unsatisfactory; but where it occurs, (as in the experiments in which Weber applied the electric stimulus to the aortic plexus without injuring the peritonæum,) the movement, both in extent and duration, is much less dependent upon the influence of the stimulus; the small intestine and the colon, which are in a state of complete rest, at the time when the current commences to flow, become affected with general and rapid movements, which continue long after the current has been withdrawn.[1] The spinal cord exhibits its reaction to the stimulus by the excitement of all nerves which pass off at or below the point of irritation; at the same time there are certain features which mark it as a central organ. First, the irritation may also extend above the injured part; galvanism applied to the inferior termination of the spinal cord of animals excites spasms not only in their hind legs, but also in muscles of the trunk and the fore legs. Secondly, the effect continues for some time after the stimulus has been removed; the rigor produced in living animals by applying the poles of the rotatory apparatus to the spinal cord, continues for some time after the of the therapeutic interest that attaches to it, he will be enabled to estimate those diseases correctly with which spasm of the glottis is found to associate itself.

---

[1] Loc. cit., p. 51.

Life is endangered by suffocation or the supervention of eclampsia. Even if the attacks are not very intense, it is necessary to be careful; for the rima of infants, which is so small and narrow, often closes unexpectedly and suddenly. Richeraud was the first to determine that the larynx and glottis, which, in early life, are very small, suddenly increase at the period of puberty, in the male sex in the proportion of 5 : 10, in females of 5 : 7. Schlemm[1] has confirmed this observation, and has added a few details; thus he found the rima glottidis of a child of 12 years, one and a half to two lines longer than that of a child of 3 years, and in the latter it was three quarters of a line longer than in a child of nine months. This relation accounts for the greater danger of spasm of the glottis, and of laryngitis in infancy, as well as for the greater mortality in animals after division of the recurrent branch, the younger the animals are. Reid[2] has observed that children brought up by hand run greater risks than children who have been nursed. The risk of a relapse continues during the whole period of dentition.

The treatment of spasm of the glottis during the attack must be directed against the asphyxia; cold water should be thrown over the head, neck and face, cold air be allowed to play upon the face,—Reid recommends blowing at the child,—the præcordia be warmed with hot napkins; the feet may be wrapped in flannel steeped in a weak infusion of mustard, and enemata with an addition of asafœtida be exhibited. It has been proposed to give chloroform, but its effect upon the brain under such circumstances would probably render it unsafe. Nobody would attempt tracheotomy at the commencement of the attack, and if postponed too long no benefit can be expected from it. During the free intervals we must direct our attention to the cause. The first thing to attend to is the atmosphere and the diet. The advantage of country over town air, especially to persons residing in confined localities and ill-ventilated rooms, is undeniable. If the circumstances of the patient who has investigated the subject accurately. He found some muscles in tetanus perfectly healthy, whilst others presented a peculiar pale grey appearance in many parts, like the flesh of fish, doubtless owing to the blood having been squeezed out of the vessels. In other parts, again, they had almost lost their fine filamentous structure, and presented a soft spotted mass, which easily tore or retained the print of the finger. Extensive ecchymoses were frequently met with, which contrasted with the pallor of adjoining parts. Under the microscope the primitive fasciculi here and there exhibited the characteristic signs of a high degree of contraction, fusiform swelling, and a closer approximation of the transverse striæ than usual. In other parts the primitive fasciculi were deduced in size, and the transverse striæ were either far apart, or had disappeared entirely. In many parts they had burst with the sheath. In the annals of surgery we meet with instances of rupture of considerable muscles with hæmorrhage, occurring in tetanus. Hypertrophy of the muscles, such as we find in the muscles of healthy individuals, as a result of long-continued exercise and labour, is also met with as the result of frequent spasms; *e. g.* in the sterno-cleidomastoid, which Bell, in one instance, found enlarged to the size of the biceps. It is not improbable that hypertrophy of the heart is frequently brought on by long-continued palpitation, in the same way as spasm of the bladder superinduces extreme thickening of the muscular fasciculi of the organ. It is important to distinguish the contraction occurring in the spasm, which is a proof of the activity of the muscle, from the contraction which occurs from a permanent shortening of the muscle. A careful observation of clubfoot, of squinting, and analogous conditions, proves that the muscular affection may be isolated from the nervous irritation to which it owes its origin; a circumstance to which Stromeyer has drawn attention.[1] The indirect effects of spasmodic contractions of the muscles differ according to the parts into which the muscles are inserted. If they are of a nature to permit free movement, movement will result, as is the case with the tongue, the eye, and articulated bones. In membranous and hollow organs, which are more attached to the surrounding parts, the spasm causes the contents of the cavity to be expelled, as in the case of the pharynx, intestine, or bladder; or again it closes the channels, and prevents the ingress of substances or the discharge of the contents, as in the larynx, the bronchi, or the uterus.

---

[1] Rudolphi; Grundriss der Physiologie, vol. ii, p. 344.

[2] Loc. cit., p. 101.

---

[1] Beiträge zur operativen Orthopädik; Hanover, 1838, p. 12.

In examining the relations of the motor nerve to the other nervous functions in spasms, our attention is first attracted to its bearing upon sensibility. The perception of muscular action, which renders us conscious of movement, of rest, or fatigue, also occurs in spasms. After an epileptic attack the patient complains of pain and fatigue in his muscles. The healthy individual requires to direct his attention especially to the point, in order to isolate one muscular movement in a complex of movements, *e. g.* in the act of respiration; we find the same to be the case in spasmodic states; and what in them has been generally attributed to habit, should rather be set down to an absence of acute attention. This is remarkably manifested in co-ordinated spasms, in which muscular movements and fatigue are borne to an extent and for a period, such as the strongest healthy individual would be unable to sustain; but even in this case, the sense of fatigue and the desire for rest at last prevail. It is different when a contraction of the muscular fibres has remained as a residue of former spasm; no fatigue is then felt, even under considerable excitement, and though the condition may continue during the whole life. Pain is caused in spasms either by the simultaneous irritation of sensory fibres; or by a mechanical irritation of the nerves appertaining to the muscle or passing through its tissue, by the contraction. The last is the case in cramps of the calves of the legs, which are accompanied by a sensation of dislocation, and in spasm of the sphincter ani; the former occurs in the spasms accompanying spinal meningitis and in the spasms of the lower extremities, brought on by dragging and pressure of the uterus or the intestines upon the sciatic plexus. The convulsions are not unfrequently preceded by hyperæsthesia, affecting the cutaneous nerves, the sympathetic, or the nerves of special sense, and known by the term aura; it is commonly met with as a symptom that precedes hysterical and epileptic fits. Pain is a much more frequent result of spasms than anæsthesia, and is owing to the compression of sensory nerves exerted by the contraction of the muscles. I have met with one case of anæsthesia of the arm brought on by spasm of the sterno-cleidomastoid and the scaleni.

The relation of the spasms to the intellect varies according as they depend upon an irritation of the motor nerves as conductors, or of the central organs. In the former case we meet with no psychical changes, however long the spasm may last; in the latter it is rarely absent, whether it manifest itself as an absence of the perceptions and decay of the mental powers, as in epilepsy; or as a subjugation of the will, as in hysteria; or a state of exaltation or aberration, as in the co-ordinated spasms.

The relation existing between spasmodic action and nutrition is manifested by phenomena occurring in the organs of circulation and in the secretions. A mechanical influence from compression of the vessels, and especially of the veins, is often produced by the rigid contraction of the muscles; thus the jugular veins are compressed by spasms of the muscles of the neck (see the chapter on Epilepsy); the consequence of this interruption to the circulation is a livid hue and the rupture of small vessels, as we meet with in the subcutaneous vessels of the leg, in cramps of the calves, or in the face in epileptic seizures. The skin and the kidneys are the secreting organs most liable to be affected. The copious, colourless, limpid urine, remarkable from the small quantity of its solid constituents, which is discharged in hysterical paroxysms, has been termed spasmodic. The perspiratory glands of the skin secrete more copiously; most freely in tetanus, when the temperature has fallen. In many spasmodic affections certain glands are peculiarly prone to excessive secretion, as the lachrymal glands in hysteria, and the salivary in hydrophobia.

Next to the excited action in spasm, it is important to examine the relations of motor excitability. Like the sensory excitability it may be exhausted by over-stimulation; this accounts for the intermission of the spasms, notwithstanding the continuance of the irritation. This exhaustion is either permanent, and paralysis and death ensue, as often happens in the spasms resulting from abnormal excitement of the central organs; or it is a temporary condition, and supplementary aid is rendered by the central organs. The exaltation of the irritability in cramps is recognised in the fact that discharges of the motor power take place spontaneously as well as upon the application of a stimulus; of this we have well-marked instances in the reflex neuroses, hysteria, tetanus, and hydrophobia. The irritability is not, however, altered in the paroxysms only, but also in the intervals, as we have already demonstrated to be the case in the hyperæsthesiæ, (see Chapter II, p. 7.) Thus most choreic patients are unable to execute a single intended movement by itself; sympathetic movements are superadded, and the spontaneous movement passes into a chorea spasm. In epilepsy and hysteria, the longer the duration of the disease, the abnormal excitability more and more pervades the entire economy, and alters the normal relation to stimuli: we shall examine the individual features, which yet demand a more careful investigation, in the analyses of these diseases.

We know but little of the anatomical characters presented by the nervous system in spasms. The scanty knowledge we possess, we owe to recent researches; we may allude to the examination of the centripetal tracts in tetanic affections, and of the brain in static spasms.

The etiology of spasms is as yet very defective; in too many cases the most careful examination does not suffice to determine any special influence. In contradistinction to neuralgia, we find a predisposition to exist in infancy, as also in youth and middle age; the female sex are predisposed even before puberty, as in regard to chorea. There are only certain forms which chiefly affect the male sex, as stammering and ruminating. Hereditary influences are frequently at work, particularly with regard to epilepsy, hysteria, and stammering. The processes of evolution, dentition, and puberty, are a fertile soil. Climatic and endemic influences favour the development of tetanic affections, spasms of the glottis, &c. There can be no doubt that there may be a predisposition to spasms in the nerves themselves; those that in health are not affected by a mental or reflex stimulus are rarely attacked, as for instance the auricular branches of the facial; whilst the nerves that in artists or mechanics have been developed by special practice of a part, are liable to become the seat of spasmodic action. In the reflex spasms a relation of certain sensory or centripetal nerves to certain motor tracts may be observed to exist, as we find to be the case in healthy reflex action. If, in children whose scrotum is relaxed, we press the finger upon the inner surface of the thigh, the testicle of the same side is drawn up, in consequence of a reflex action from the cutaneous branches of the crural nerve to the motor nerve of the cremaster. If the finger be applied more firmly, more rapid or decided movement ensues, and the retraction of the cremaster keeps time with the pressure. If the experiment be made alternately on both sides, the movement may be excited more frequently than if by constant repetition on the same side, the irritability is exhausted. Tickling the root of the tongue causes retching, and irritation of the pharynx gives rise to the movements of deglutition. Thus spasm of the face and spasm of the glottis are produced by irritation of the dental branches of the fifth pair, strabismus follows irritation of the intestinal nerves, respiratory and œsophageal spasm is brought on by irritation of the uterine nerves. Psychical influences are a fruitful source of spasms. The effect of the imagination on seeing spasmodic movements, and even the mere recollection of them, may give rise to convulsions; this is still more the case if the mind be strongly directed to the subject, as in the case of palpitations of the heart; the most effectual cause is emotion, and especially fright. Finally, among the causes affecting the nervous tissues themselves, irritation of the peripheral and central organs by external injuries (traumatic tetanus), as well as by diseases of the membranous and osseous envelopes, are not to be overlooked. A most important causal nexus exists between spasms and the normal stimulus of the motor nerves, the blood. For a long time plethora and congestions of the central organs were looked upon as the exclusive sources of spasmodic action; a great advance has been made in our days, by establishing the etiological claims of anæmia, which, as in the female sex, is either of an idiopathic character or a secondary affection, resulting from hæmorrhage or other fluxes. Some foreign substances which become mixed with the blood, some of which possess a specific influence, demand a consideration; strychnine, ergot, and volatilised quicksilver, act upon the spinal cord, the poison of hydrophobia upon the medulla oblongata, lead, narcotics, alcohol, and exanthematic contagion upon the brain and spinal cord. Dyscrasic states of the blood and the diseases dependent thereon, impetiginous diseases, trichoma, &c., promote the origin of spasms; the arrest of secretions from the blood by means of the glands, especially the kidneys, belong to this sphere.

A special relation exists between the rhythmic spasms, which have as yet met with little attention, and which are isochronic with the pulse, and the arterial circulation. Some years ago, my attention was first directed to this point in a female patient, who applied for relief in the hospital that was under my superintendence. It was a woman, 48 years of age, who had formerly been a devotee to gin-drinking, in consequence of which her digestion had suffered; from time to time, she was affected with violent palpitations, and these were accompanied with convulsive movements of the left arm, which were exactly isochronic with the beat of the heart. As the palpitations subsided, the number of the convulsive jerks of the left arm were reduced in exactly the same proportion. During the intervals, the patient found the affected arm weaker than the healthy one, although the pressure of her hand was still vigorous. The impulses of the heart proved, on examination, to be moderately increased, but the pulsation of the right carotid was much more visible and marked to the touch than that of the left. The employment of the acetum digitalis, for eight days, was followed by a remission of the morbid symptoms, though we are unable to vouch for the permanency of the cure, as the patient withdrew from observation. At the time when she presented herself, the experiment of compressing the carotids had not yet been suggested; otherwise, this case would have been peculiarly adapted to this proceeding. I was the more interested in meeting with a case observed by Parry, which will be communicated in detail in the chapter on Epilepsy. In this instance, vibrations of the left forearm occurred, varying in frequency, though with tolerable regularity, and generally about eighty in the minute, like the pulse. They increased in frequency and intensity, if the individual exerted himself or became heated. The pulse of the carotids was very full and strong. Parry predicted that pressure on the right carotid would remove the paroxysm, but that pressure upon the left would not affect it; and so it happened each time compression was exerted. The irritation caused by living organisms within the human body, is a not unfrequent cause of convulsions; the influence of worms has formerly been over-estimated, and the fœtus has been too little regarded, as the silence of older authors with regard to the chorea of pregnant women proves. It is frequently caused by sexual over-excitement, by masturbation, [illegible] by [illegible] and unsatisfactory condition. [illegible] of temperature, sudden cold after previous heat, is apt [illegible] produce tetanus, and the tendency is increased by [illegible] of wounds.

The prognosis of spasm is determined by the seat of the affection. When a few peripheral tracts only are involved, the danger is less than when the central organs are affected; as an example, we may point to simple trismus as opposed to trismus accompanying tetanic affections, to spasm of the œsophagus as opposed to hydrophobic dysphagia. When the peripheral affection becomes central, the danger is imminent; this is the case when spasm of the glottis passes into convulsions, or when eclampsia supervenes upon spasmodic labour pains. The prognosis is rendered unfavorable by a repetition of the paroxysms, as the conduction of the motor fibres is increased in proportion to the frequency of their stimulation. In forming a prognosis, we must also take the effects of the spasms into consideration, *e. g.* the obstacle to the admission of air in spasm of the glottis, the retention of urine in spasm of the neck of the bladder. We must not mistake for cures, the intermissions which occasionally take place for a considerable period, owing to the eruption of a new disease, or during pregnancy and lactation, or at the commencement of new modes of treatment, from the psychical influence that is exerted.

The spontaneous cure of spasms is induced by a resolution of the morbid condition in which they originate, or by a translation to the sphere of nutrition, accompanied by critical phenomena, such as hæmorrhage, cutaneous eruptions, or ulcers; or the cure may be brought about by the natural processes of development or decay of the organism, dentition, puberty, and decrepitude.

In regard to the treatment, we must first attend to the indication of removing the cause; by which means, we at times obtain the most brilliant results, as demonstrated by the cure of the spasms that take their origin in toxic influences, in dyscrasic states, or in reflected irritation, or even by the diminution of the frequency of certain affections, *e. g.* traumatic tetanus. Yet the therapeutic effect is, in many cases, very limited, owing to the imperfect state of our knowledge, or to our being unable to reach the cause; and even when we have removed the cause, the altered irritability, which has its seat in the central organs, continues to present an impediment. To reduce this irritability to the healthy standard, is more easily done by regulating the diet and regimen than by drugs, a fact which the history of epilepsy and hysteria sufficiently proves. It is here that the cold applications so much in vogue at the present day are of utility. The relation of the nerves to the blood should be especially attended to. Great caution should be exercised in taking blood profusely or frequently from patients subject to spasm, even when plethora is present; epileptic subjects become obtuse more rapidly, and tetanic patients die sooner. It is only under certain circumstances that we can expect any beneficial result from such treatment, as after the suppression of habitual hæmorrhages and in puerperal eclampsia. We may expect more from an arrest of the supply of blood, as Parry has first attempted by compression of the carotids, a subject to which I shall return in speaking of epilepsy. In anæmic patients affected with spasmodic diseases, tonics, and especially steel, are imperatively demanded. The antagonistic system of treatment by means of derivation to the intestinal canal or the skin, dates back to old times; nor can it be doubted that we may achieve a cure by establishing cutaneous eruptions and ulcers. Finally, the statics of motor excitements, and their relation to sensory and psychical irritability, afford us an indication for the treatment of spasms, which, if conducted with ingenuity and intelligence, may be expected to yield very satisfactory results. The withdrawal of the stimuli of the senses, as the stimulus of light, operates beneficially; hysterical convulsions often cease rapidly when the eyes are bandaged. The calm obtained by narcotic agents, though generally but palliative, need scarcely be alluded to. We often have opportunities of satisfying ourselves of the salutary effect produced by opposing a mental effort to reflex action.

When this rational mode of treatment affords no relief, the use of empirical remedies is justified, if their value has been tested by experience. Of these, the metallic preparations, iron, zinc, silver, copper, and arsenic, have been shown to merit our confidence. For certain forms of spasm, modern surgery has introduced myotomy, a proceeding which not only removes the residuary effects of spasm, contraction of the muscle; but may also exert a beneficial action in calming the nervous irritation during the persistence of the spasm.

CHAPTER III.

SPASMS IN THE RANGE OF THE FACIAL NERVE.

HISTRIONIC SPASM OF THE FACE.[1]

Mimischer Gesichtsschmerz.—Tic convulsif.

Experimental Results.—In the living animal every stimulus applied to the facial nerve, whether mechanical, chemical, or galvanic, induces contraction in the muscles of the face, supplied by the irritated fibres. By isolating the irritation, and continuing it to single twigs or divisions of the nerve, the contraction may be limited to a single muscle, or even to separate layers of the same muscle. The irritation itself, as Backer, Eschricht, Müller, and others have observed, is painful; yet this sensibility is only of an associated character, caused by the union of a branch of the vagus with the trunk of the facial in the Fallopian canal, and chiefly by the apposition of its final distribution to fibres of the fifth; Magendie[1] has the merit of having demonstrated them, and proved their difference in animals.

I am unable to delineate the histrionic spasm of the face more accurately than by stating that it is characterised by alternating or permanent grimaces of one side, or, more rarely, both sides of the face. In the former case, elevation and depression of the occipital and frontal muscles, corrugation of the eyebrows, winking or closing the eyelids, jerking or snuffling with the nostrils, distortion of the angle of the mouth, are the prevailing features which supervene suddenly, disappear rapidly, and return after short intervals. The permanent contraction of the muscles of the face is much less frequent, and has only in our days been brought to our knowledge by some observations of Dr. Marshall Hall.[1] The enduring contraction of the muscles of expression, renders the furrows and dimples on the affected side deeper; the tip of the nose, the commissure of the lips, and the chin are drawn over to the affected side; the muscles feel tense and hard, and render movement difficult, so that the corresponding eye cannot be closed with the same facility as the other.

---

[1] Leçons sur les Fonctions et les Maladies du Système Nerveux, vol. ii, pp. 170, 180, 181.—[See Note, page 40. Ed.]

In the play of the features during speaking and laughing, the distortion of the features becomes more apparent. The will generally has but little influence upon preventing or modifying the attacks; and even the limitation of the influence of the will to separate branches of the facial nerve appears impaired, by which means we may account for the sympathetic movements. Whenever Dr. Marshall Hall's patient attempted to close his eyelids, the angle of the mouth was drawn down, and his nose and chin were dragged to the same side. In the other case the patient was unable to move the right angle of the mouth without at the same time closing the upper eyelid.

The state of sensibility of the face varies. At the commencement the spasm is often associated with painfulness.[2] This ceases subsequently, and the patient has no sensation whatever of the tonic contraction of the muscles, however long it may endure. At times the sensibility is more obtuse than in health.

The spasm affects the entire range of the facial nerve, or only some of its branches. Blepharospasmus and risus caninus present us with instances of the latter variety.

Spasm of the eyelids (blepharospasmus), caused by an affection of the palpebral twigs of the facial, is characterised by twitching of the orbicular muscle, which may only affect single bundles of its fibres, and especially those which cover the tarsus of the lower eyelid; or it manifests itself by a rapid opening and closing of the eye, (winking, nictitatio,) or again it occurs in the shape of a rigid, firm compression of the eyelids, which is apt to give rise to ectropium, if a forcible attempt be made to open them.

---

[1] On the Diseases and Derangements of the Nervous System; London, 1841, p. 342.

[2] See Bellingeri de Neuralgie Faciei, in his Dissertatio Inauguralis, August. Taurin. 1818, pp. 212—224

The risus caninus (spasmus cynicus, γέλως σαρδωνικός,) is caused by the disease occupying the malar or labial branches of the facial nerve, and induces a movement and position of the lips, resembling laughing on one or both sides of the face.

It is most rare to find the spasm proceeding from the auriculo-muscular branches of the facial. Hitherto I have only met with one case of the kind, which presents itself vividly to my recollection; it occurred in a woman aged 49, who was attacked twenty-seven years ago with apoplexy, accompanied by paralysis of the right arm. Her recovery was slow and imperfect; weakness of the arm, and headache, show the persistence of a cerebral affection; at the same time spasmodic movements of both ears occur several times every day, and especially after emotions, during which they are drawn up and down with great rapidity for five or ten minutes at a time. The spasm is always accompanied by loud tinnitus aurium. No convulsive movements are met with in any other parts of the body. In another case I saw cramp of the ears precede the epileptic seizure, and thus take the place of the aura. The great rarity of auricular spasm in man accords with the fact of these nerves being withdrawn from the influence of the will in man. It is a different case in mammalia, whose auriculo-muscular nerves are more numerous, as they have to supply seven more muscles than the human species possesses. This renders the ear so expressive a feature in animals, and in them enhances the importance of the indications of disease, derived from its movement and position; even hemiplegia is characterised in them by a flabby pendulousness of the external ear of the paralysed side. Histrionic spasm of the face occurs uncomplicated, or in combination with convulsive affections of other nerves,—the lesser portion of the fifth, the hypoglossus, the accessory, or the spinal nerves.

Spasmodic distortion of the face is to be distinguished from paralysis, by the side which is not distorted maintaining its motility perfect, the reverse of which is the case in histrionic paralysis. Occasionally, though rarely, facial spasm originates in facial paralysis, of which Marshall Hall[1] has communicated an instance.

The disease is either seated in the peripheral or central part of the facial nerve. Only a few of the causes to which it can be attributed are known. Occasionally it is referable to the contact of extreme cold, or of a cold current of air impinging upon the nerve in its passage through the face, and especially upon the palpebral branches. Under such circumstances, rheumatic affections of other parts may be associated with the spasm. I have been informed of one case in which the irritation caused by an inflamed gland in the vicinity of the stylo-mastoid foramen gave rise to the spasm. Causes affecting the facial nerve within its osseous capsule, or at the basis of the brain, and exciting spasmodic action, have not yet been discovered. Among the more frequent causes, reflex irritation deserves a prominent place. The old Greek physicians assumed a relation to exist between risus sardonicus and wounds of the diaphragm. It not unfrequently occurs in tetanus (risus tetanicus). Thus it may be excited by itself by any centripetal irritation, and in this respect the tract of the fifth nerve demands attention. Centripetal irritation either reaches the brain directly, and is converted into a conscious perception, or it is confined to the spinal cord, and the patient remains unconscious of it. The former case is illustrated by the spasm of the eyelids caused by a grain of sand being introduced into the eye, or by mechanical injuries of the organ, and frequently preventing the removal of the foreign body. Persons whose eyes are provided with scanty brows and pale lashes, or whose lashes are destroyed, and are therefore exposed to greater irritation from the light, frequently suffer from nictitatio, and photophobia is commonly associated with blepharospasmus. Thus histrionic spasm often accompanies tic douloureux; but though the sensory irritation may not be perceived, its source may be occasionally discovered, as in the following case recorded by Mitchell:[1]

---

[1] Loc. cit., p. 347.

A female, 50 years of age, was suddenly attacked with spasms of the facial muscles and the tongue, which, after the lapse of a fortnight, extended to the neck. The paroxysm commenced with a sense of weakness and oppression at the præcordia, and a violent shooting pain passing from the sternum to the spine, rising upwards to the tongue, which then became as stiff as a piece of wood, bending the point upwards to the left side of the arch of the palate. A sense of numbness attacked the left side of the nose and the chin. The left angle of the mouth was opened and was distorted, the teeth were closely compressed, all the muscles of the face became rigidly contracted, the nose was drawn over to the left side, and the forehead and eyebrows were corrugated by the spasm of the occipito-frontal and corrugator supercilii muscles. The muscles of the neck rotated the head to the left shoulder, the left arm became extended, and a sense of numbness ran down in a straight line from the neck to the thumb and forefinger. Consciousness and the action of heart and lungs continued unaffected. After three minutes there was a remission, commencing with a tremor of all the affected muscles. These paroxysms returned day and night, at short intervals of ten minutes. As the treatment pursued produced no effect, another physician was consulted, who had seen a similar case of facial and lingual spasm cured by the extraction of a carious tooth: on examining the teeth of this patient, though she did not complain of toothache, one tooth was found in the upper left row to be in a morbid condition, and sensitive to the touch. The gum was inflamed, and a fetid matter was discharged. After the first molar was extracted, and the gums had been scarified, the paroxysms diminished in intensity and frequency, and entirely ceased after the extraction of all the carious teeth.

---

[1] Medico-Chirurgical Transactions, vol. iv, p. 25.

In this case the centripetal influence proceeded from the fifth pair, in others it arises from the intestines, and thus helminthiasis occasionally gives rise to blepharospasmus in children. The irritation sometimes originates in the uterus, and I have seen the risus caninus strongly marked in the hysterical paroxysms of several patients who presented a trichomatous cachexia.

It is rare to meet with central causes of facial spasm. In antiquity a variety of ranunculus, termed by Dioscorides Herba sardonia, and by Linnæus, Ranunculus sceleratus, was supposed capable of producing a state of intoxication, which, on account of its causing a sardonic distortion of the mouth, was called apium risus; modern observation has not confirmed the fact. Psychical influences occasionally act as exciting causes; thus I am acquainted with an instance in which the disease affected a female, in consequence of the fright caused by the sudden death of her husband; emotions, however, are not the only influences of the kind, but the power of imagination and imitation may also give rise to it, though this is more frequently assumed than demonstrated. Spasm of the face very rarely depends upon disease of the brain, excepting the variety which accompanies epileptic seizures. Six years ago I had a robust man, of 36 years of age, under my care, who, after a powerful mental emotion, was attacked with paralysis of the left side in a slight degree. The muscles of the face and the arm were particularly affected, as well as the articulating movements of the tongue. The paralysis disappeared after the abstraction of blood and the administration of purgatives, but violent spasm set in, affecting exclusively the left half of the mouth and the platysma myoides; it persisted for four days and nights, and gradually yielded to cupping and tartar emetic, and the endermic application of morphia. With the strongest effort of the will the patient was not able to arrest the convulsive action for more than a few moments.

Chorea is frequently accompanied by facial spasm. In the majority of instances, however, it is impossible to discover any etiological relation, as little as we can discover any relation to age or sex. Pujol's[1] assertion, that men are more subject to this affection than females, has not been confirmed by the experience afforded by my own practice. The most common exciting cause of the attacks, and of their increased intensity, are emotional affections; and more particularly embarrassment of the patient when he thinks himself observed by anybody. In a case observed by Dieffenbach an intermission occurred during sleep.

The *treatment* of histrionic spasm of the face is generally ineffectual, owing probably to our frequent ignorance of the cause, as well as the neglect of the early stages of the diseases, which, especially in children, are generally misinterpreted as a bad habit. We are most likely to meet with success in the treatment of the spasm which originates in a rheumatic attack, and is confined to certain portions of the facial nerve. In rheumatic blepharospasmus, in addition to the suitable internal what is called breaking a habit depends. Yet permanent improvement can scarcely be achieved, even at the commencement of the malady, if at all. It may be worth while, in very old cases, to employ electro-magnetism, and continued pressure by means of a small compress, applied according to the extent of the disease, either on the trunk at its exit from the stylo-mastoid foramen, or one of the divisions of the facial nerve. The division of the nerve would undoubtedly remove the spasm, but it would substitute paralysis. In order to avoid this evil and yet to attain the same object, Dieffenbach divided all the facial muscles. The case alluded to is that of a man, aged 43, who nine years previously, after passing from a room at a high temperature into a cold draught, had been suddenly attacked with twitchings of the orbicular muscle of the right side; they continued for a considerable period, but met with the less attention, as they occasionally remained in abeyance for some time, and in warm weather, and during the south wind, intermitted for whole days. They gradually extended over the entire right side of the face. While the left side bore the habitual expression of the individual, the features of the right side were constantly being shaped into new grimaces by the vivid play of the individual muscles, the forehead was corrugated, the trembling eyelids were thrown open and again compressed, and the right angle of the mouth extravagantly drawn up by the zygomatic and levator anguli oris muscles, which could then be felt like tense cords under the skin. When this happened it was impossible to continue a conversation, and speech, especially the labial consonants, failed the patient. He often suffered great inconvenience from his complaint, and could only relieve himself during a paroxysm by carrying the right hand rapidly to the cheek, and inducing a remission of the paroxysm by firm pressure and control of the affected muscles. On the other hand he was able to excite the twitchings spontaneously by attempting to close the eye by contraction of the orbicularis. Going to sleep was therefore attended with some trouble, and it was necessary to close the eye carefully and gradually. During sleep the muscles of the face were perfectly placid. Pressure upon the points of exit of the facial and infraorbital nerves neither increased nor diminished the disease. All the remedies previously employed had failed; the patient was therefore very ready to submit to an operative procedure for the cure of his malady. A long-pointed fistula knife was introduced near the right angle of the mouth, passed under the mucous membrane of the cheek, and pushed up to the commencement of the margin of the lower eyelid. Dieffenbach then turned the edge to the muscles and severed them, while withdrawing the knife, but without in the least injuring the skin. This cut divided the lower portion of the orbicularis, and the zygomatici and levator anguli oris in the middle. The knife was again introduced at the external angle of the eye, carried through the mucous membrane under the integuments outwards, and in withdrawing it the orbicularis was once more divided. After each application of the bistouri, the abnormal movements diminished; the knife was therefore introduced once more through the mucous membrane of the upper lip, pushed up by the side of the nose in order to divide all its muscles, and especially the depressor alæ nasi.[1] The good effect which was the immediate result of the operation, has been almost entirely maintained. A year and a half after the operation a careful examination of the patient showed that the convulsions had entirely ceased, and that merely a tremor and agitation remained, especially affecting the orbicularis, but which was not to be compared with the former agonising spasm.

---

[1] Abhandlung über diejenige Krankheit des Gesichts welche der Schmerzhafte Trismus genannt wird, nebst einigen Betrachtungen über den Hundskrampf des Cœlius Aurelianus, übersetzt von Schreyer; Nürnberg, 1788, p. 93.

---

[1] Dieffenbach, über des Durchschneidung der Sehnen und Muskeln; Berlin, 1841, p. 314.

CHAPTER IV.

SPASM IN THE MUSCLES, SUPPLIED BY THE PORTIO MINOR OF THE FIFTH PAIR.

MASTICATORY SPASM OF THE FACE.—TRISMUS.

Experimental results.—Bell[1] was the first to prove the motor power of the lesser portion of the fifth pair; by irritating it in recently killed animals he caused the muscles of the jaws to move, so that the jaws closed with a snapping noise. Valentin[2] has repeated these experiments in the dead bodies of horses, cats, and rabbits, before they had lost their irritability; and succeeded in obtaining contractions of the muscles of mastication by irritating both the root and the separate branches of the third division as they enter the muscles. Volkmann[3] has confirmed these results, and has also observed that irritation of the fifth pair never causes the buccinator or the angle of the mouth to move, as Bell has stated to be the case.

The masticatory spasm of the face differs in form according as the nerves distend, for the different movements of the lower jaw are affected, and according to whether the spasm is of the tonic or the chronic variety. The nerves of the elevators of the jaw are most frequently affected, those supplying the masseter and temporal muscles; less frequently those of the abductors, the pterygoid muscles, and least of all those of the depressors, the mylohyoid, and digastric. The affection may be limited to one side, or it attacks, as is more commonly the case, both sides.

In spasms of the masseter and temporal muscles, the lower jaw is approximated to the upper, and in the tonic form remains fixed in this position, so that in the highest degree the teeth are firmly compressed, and cannot be separated by force (lock-jaw). The muscles themselves feel as rigid as a board. In the clonic form the jaws chatter, as in the cold stage of ague, and the muscles are seen to rise and fall forcibly. Bell[1] relates a case of this unusual kind of spasm; he was consulted by a lady who was reported to be affected with a remarkable disease, in the shape of pulsating tumours of the head and face. On examining her it appeared that there was violent spasm of the temporal and masseter muscles, causing them to swell and to rise; the jaws were so forcibly compressed as to dislocate the teeth. The play of the features continued undisturbed and unembarrassed. I have met with a similar case which I have related in the 'Klinische Ergebnisse,' p. 45, (1840.) The patient, æt. 65, had suffered from histrionic spasm several years previously, and had recovered from it gradually without any medical advice. After a gastric nervous fever she retained a chronic spasm of the masseters, causing a chattering of the teeth, which only ceased at night; towards evening it became so intense as to cause a concussion of the whole head. The right side was more violently affected than the left. If the hand was placed upon the cheek, the jerking contractions of the masseters were distinctly perceptible, whilst the temporal muscles and the muscles of expression continued at rest. There was no pain except when the spasmodic action was very intense. It deserves to be mentioned that the latter ceased during mastication. Clonic spasm of the abductor muscles of the jaw is characterised by grinding of the teeth and chewing movements; I am ignorant of its occurrence in the tonic form. In the few observations on record of spasms of the depressors of the jaw, it is described as assuming the tonic character. In a dissertation by Kirschner[2] the details of a case of epilepsy are given, in which a closed and open lock-jaw alternated.

---

[1] The Nervous System, &c., pp. 28 and 83, 3d ed., 1836.

[2] Valentin; De Function. Nervor. Cerebr. et Nervi Sympathici, pp. 23—27.

[3] Ueber die motorischen Wirkungen der Kopf und Halsnerven, in Müller's Archiv für Anatomie, &c., 1840, p. 485.

The patient occasionally experiences a painful tension in the contracted muscles of mastication, but in the majority of cases no pain is felt. The masticatory spasm, like the histrionic, occurs by itself, or complicated with other spasms.

The affection may be confounded with diseases of the articulation of the jaw, and of adjoining parts which produce an immobility of the jaw. Thus we find a case in 'Bright's Reports of Medical Cases,'[3] in which anchylosis of both maxillary articulations and ulceration of the articulations of the first and second cervical vertebræ, were accompanied by symptoms resembling trismus and tetanus. The painfulness of the joint which manifests itself on examination, the absence of muscular tension, and the longer continuance of the disease, afford sufficient diagnostic distinctions.

---

[1] Loc. cit., p. 83.

[2] De Maxillæ inferioris divaricatione tetanoide; Berlin, 1825.

[3] Vol. ii, p. 418

The causes affect the peripheral and central tracts of the motor portions of the fifth. The mere impression of cold upon the surface of the face may induce trismus.

A man of 43 years of age is under my care, who for the last four years, has been subject to a *dying away*, in a marked degree, of the upper and lower extremities, especially of the hands and feet, accompanied by numbness of the muscles; it is brought on immediately by exposure to cold. At the same time the masseters and the tongue become rigid, and a great difficulty of opening the mouth and swallowing supervenes. Sudden changes of heat and cold give rise to trismus; this form has hitherto been termed rheumatic, and has improperly been looked upon as a primary affection of the muscles. Generally speaking, the peripheral distribution of the motor portion of the fifth is less frequently affected in this way than the facial nerve; whereas it is more often implicated than the latter in diseases of the base of the brain.

On the 28th September, 1830, I was called to see an old woman of 74, who for seven months had suffered from hemiplegia of the left side, and chiefly of the arm, accompanied by anæsthesia. The day previous to my seeing her she had suddenly become apoplectic, and, as the friends stated, her teeth had from the commencement been so firmly clenched that it was impossible to introduce even liquids into the mouth. I did not find her comatose, but she was unconscious, and gave no evidence of understanding the questions addressed to her. Her head and neck were rigidly turned to the left side, and both eyes were immovably directed to one point. The trismus was so intense that no force was adequate to separate the teeth and the jaws. At the same time the entire left side of the face and a large portion of the right was insensible to every kind of irritation. The play of the features continued unimpaired. This condition lasted seven days, on the eighth sopor supervened, followed by death on the ninth. A few hours [illegible] swallowed about a [illegible] post-mortem examination was [illegible] considerable hypertrophy [illegible] An osseous concretion [illegible] occupied the anterior portion of the [illegible] albuminous exudation on the arachnoid, [illegible] especially in the vicinity of the vertebræ, where [illegible] were intimately adherent to one another. [illegible] glands contained a calcareous concre- [illegible] rough and angular surface to the touch. [illegible] opaque, thickened, and in many parts [illegible] by a gelatinous exudation separating it [illegible] The greater part of the arterial network [illegible] was ossified. In the medullary matter [illegible] the right hemisphere, there was a spot [illegible] size of a plum extending to the roof of the [illegible] The medullary tissue at this part was perfectly [illegible] elsewhere it presented the ordinary consis- [illegible] of the softened portion was of a dirty grey, [illegible] dots and streaks. There was a second [illegible] the size of a cherry, and of a reddish- [illegible] right thalamus opticus. Both peduncula [illegible] and the roots of the fifth pair on both [illegible] the latter so much so that they were [illegible] The ganglia Casseri were not implicated in [illegible] The remaining cerebral nerves at the base of [illegible] ordinary appearance and consistency. [illegible] quantity of yellow serum in the lateral [illegible] A large quantity of fluid was discharged [illegible] on lowering the head.

[illegible] the teeth also accompany meningitis [illegible] and masticatory movements occur in [illegible]

[illegible] masticatory spasm, reflex irritation deserves [illegible] It is by no means an unfrequent [illegible] irritation of sensory nerves, whether the [illegible] or not, reflected exclusively by the [illegible] fifth pair. The centripetal excitement [illegible] immediate vicinity of the nerves of mas- [illegible] frequently at a distance, in the [illegible] trunk or the extremities. Mr. Travers[1] has communicated a few instances of this. One was that of a young woman liable to hysterical paroxysms, who after the extraction of a lower molar of the right side, accompanied by splintering of the alveolar process, was affected on the following day by trismus: at the time when Mr. Travers saw the patient, the affection had already lasted three months. The masseter and temporal muscles of the right side were rigidly contracted. The patient was fed by an elastic tube introduced through an opening caused by the absence of a tooth. In other respects she was well. Subsequently chorea of the upper extremities supervened. In another case, the kick of a horse in the right inguinal region, had caused a tense circumscribed tumour in the hypogastrium, along the sheath of the rectus abdominis muscle. The patient was suddenly seized with trismus. The tumour was punctured, and half a teacupful of pus was discharged. The trismus diminished at once, and ceased altogether after a few days. Clarus[2] relates the case of a young and sensitive woman, who, during the seventh month of pregnancy, cut her left thumb with a somewhat blunt knife, the incision passing across the external side of the second joint, and penetrating to the tendons; it was not more than an eighth of an inch long. The wound gave much pain, but bled little and healed rapidly; a few days later, a sense of dragging and tension commenced in the left hand, and extended to the neck; a similar feeling now affected the muscles of mastication, the lower jaw could only be separated from the superior maxilla to the extent of about half an inch, and mastication became a matter of difficulty. This condition continued in a more or less marked degree for about four or five weeks, and yielded at last to the employment of baths and change of air; though a peculiar sensibility of the seat of injury, and a sense of tension in the wrist, continued for a considerable period. Not long since, I had an opportunity of observing the occurrence of tension of the masseters and impeded movement, and painfulness of the lower jaw of the right side, in a man labouring under fracture of the right tibia and fibula; the affection came on on the tenth day after the injury, and disappeared spontaneously after a few days. Helminthiasis occasionally gives rise to trismus or grinding the teeth; the latter symptom also occurs as the reflex action propagated from the fifth pair, during dentition. Nor does trismus occur merely in the normal state of reflex action; it is even more frequent when this function is morbidly excited; tetanus generally commences with this symptom, and hysteria is frequently associated with chattering of the teeth, the clonic form of the masticatory spasm. Excepting reflex action, there are very few causes residing in the central organ, which give rise to trismus; we have, however, yet to mention epilepsy, in the paroxysms and intervals of which the spasm of the jaws not unfrequently occurs; at times, it accompanies intermittent fever. Graves[1] has adverted to the occurrence of grinding the teeth in gouty subjects, which may become so enduring and violent as to wear down the teeth.

---

[1] A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 311.

[2] Der Krampf—in Pathologischer und Therapeutischer Hinsicht systematisch erläutert, 1 Theil.; Leipzig, 1822, p. 216.

The *prognosis* depends mainly upon the state of the reflex action. If this is exalted to a tetanic affection, trismus must be looked upon as one of the most fatal diseases; and it runs a more acute course, as we have detailed fully in the description of tetanus. But when the reflex action is not itself increased by a morbid state of the central organs, the trismus excited by sensory irritation is of little consequence, and corresponds in its duration to that of the centripetal stimulus; it then frequently becomes chronic. This point is of material importance in forming the prognosis, for trismus is generally looked upon as hopeless. Among the other varieties of trismus, that occurring in epilepsy is of least consequence; but when it supervenes upon inflammatory conditions of the brain, it indicates danger, as it evidences irritation at the base of the organ, in the vicinity of the medulla oblongata.

The main point to be attended to in the treatment of reflex trismus, is the removal of the sensory irritation, whether it be owing to the teeth, a wound, or the state of the stomach. Scarification of the teeth during the period of dentition operates beneficially in this way. In a paper on amaurosis following injuries of the brow, Von Walther[2] quotes a case observed by Carron du Villard, in which trismus caused by the extirpation of an encysted tumour was removed by division of the frontal nerve. Earle[1] met with a case in which recovery ensued immediately upon the discharge of a tapeworm. When the cure is delayed, the local application of narcotic remedies, in the shape of ointments and plasters, is to be recommended. When there is a tetanic complication, the treatment appropriate to tetanus must be adopted. When trismus accompanies epilepsy, opium in enemata, or applied endermatically, proves effectual; of this I have seen one case, in which the treatment was followed by speedy cure. A widow, aged 37, who was married in her fourteenth year, was attacked in her fifteenth, after a laborious and artificial delivery, with epilepsy; to which she had since continued liable at irregular intervals. She only remained exempt during the lactation of three children, but the infants themselves died under violent convulsions. Several years ago, she was under treatment in a hospital, where, after an epileptic attack, trismus supervened, which continued for seventeen days, and then yielded on the extraction of some teeth, and the instillation of tincture of opium. On the 26th of October, 1832, while at market, she was subjected to great annoyance, in consequence of which she fell down in violent convulsions, and when they ceased she was affected with aphonia and trismus. On the following day, I found the jaws closely compressed, resisting every attempt to open them. The masseters resembled two thick cushions, while the muscles of the neck and the abdomen were free from contractions. I ordered one third of a grain of acetate of morphia to be sprinkled every three hours upon a blister on the thorax. After the third powder the voice returned, and after the fifth, the patient was enabled to open her mouth without the least difficulty. When there is an inflammatory condition at the base of the brain, the treatment suitable to meningitis is indicated.

---

[1] A System of Clinical Medicine, vol. i, p. 465.

[2] In Graefe and Walther's Journal für Chirurgie und Augenheilkunde, 1840, vol. xxix, p. 525.

---

[1] Travers, loc. cit., p. 298.

CHAPTER V.

SPASM IN THE RANGE OF THE NERVES OF THE EYE, THE OCULOMOTOR, THE TROCHLEAR, AND THE ABDUCENS.

STRABISMUS, NYSTAGMUS, SQUINTING.

THE division of the muscles and tendons in strabismus has demonstrated the valuable assistance which may be rendered to the investigation of the physiological conditions of morbid states by an operation executed by reflecting and intelligent surgeons. Böhm's[1] excellent monograph is a strong proof of this statement. The point that concerns us most at present, the nervous influence, psychical and reflex, upon the origin and promotion of squinting, has also been investigated by this author. Nevertheless, the observations of the strabismus caused by spasm are as yet the least satisfactory, whilst the paralytic variety has been more fully considered and elucidated.

Authors have spoken of spasm of the muscles of the eye as tetanus oculi.[2] Considering the variety of origin of the motor nerves of the eye, it is more than doubtful whether an affection of this kind ever occurs. A single muscle, the rectus externus, is even supplied from a double motor source; one arising from the brain by the sixth pair, and one by sympathetic fibres coming from the superior cervical ganglion and lying in close approximation to the abducens. Spasm produces a uniform or irregular oscillation of the eyeball between the antagonising muscles, which has been termed nystagmus. The direction is commonly horizontal, between the external and internal rectus; very rarely, if ever, vertical; sometimes, as in a case related by Bell,[3] semi-rotatory. In the instance referred to, the patient had lost his right eye; and the centre of the cornea of the left had been opaque for twenty years. This eye unintermittingly and spontaneously rotated to a semi-circle. The rotation amounted to a quarter of the circumference of the eye. The cornea approached nearer to the nose than usual, so that there was an appearance of strabismus. Demours[1] relates a similar case, affecting two brothers of from 30 to 35 years of age, who from birth had suffered from rotation of the eyeballs.

---

[1] Das Schielen und der Sehnenschnitt in seinen Wirkungen auf Stellung und Sehkraft der Augen.; Berlin, 1845.

[2] See Ruete; Lehrbuch der Ophthalmologie, p. 635.

[3] The Nervous System, &c., 3d ed., 1836, p. 372.

The term strabismus is applied to spasm affecting the muscles in both eyes or in one only, or alternately in either, by which the coincidence of the optic axis in one direction is prevented. The branch of the oculomotor supplying the rectus internus is most frequently affected, giving rise to strabismus convergens; less frequently the abducens (strabismus divergens), and least of all the branches of the oculomotor, which are distributed to the rectus inferior and superior; the last forms may be looked upon as exceptional, whilst the same nerves and the twig supplying the levator tarsi, which is not known ever to be spasmodically affected, are more frequently exposed to paralysis. We know least of all of spasm of the oblique muscles of the eye; although it may be assumed that in outwards and downwards squinting the trochlear nerve is affected, if we adopt the view expounded by Hueck and Volkmann that the oblique muscles are endowed with the functions of rotating the eye on its axis, which enables the rays of light reflected from an object to fall upon identical points of the retina, even when the head is turned to one side. The lower oblique directs the pupil in an arc, upwards and outwards, and the superior oblique outwards and downwards.[2] Finally there are spasmodic affections of the recti muscles, by which the bulb is retracted, and of the oblique, by which it is drawn forwards.

Nystagmus and strabismus may exist by themselves, or they are complicated with other convulsive affections, *e. g.* of the eyelids (nictitatio), of the trunk, with chorea or epilepsy.

The distinction between spasmodic strabismus and the paralytic form consists in this, that in the former the voluntary movement of the bulb in other directions, though difficult, is not destroyed, whilst in the latter the movement by the paralysed antagonist is rendered impossible.

---

[1] Dictionnaire des Sciences Médicales, vol. xxxv, p. 582.

[2] Volkmann; über die Motorischen Wirkungen der Kopf und Halsnerven,—in Müller's Archiv für Physiologie, 1840, p. 481.

The etiology of spasmodic strabismus is yet enveloped in great obscurity; nor have the recent researches into the nature of the disease at all cleared it up. Peripheral causes are the least frequent; those hitherto observed were seated at the base of the brain. Thus nystagmus often accompanies meningitis of the base of the brain, especially in infancy.

In the month of February, 1833, I was called to a child of thirteen months, which, according to the statement of the mother had been affected with convulsions of the extremities immediately after birth, which had since occurred from time to time in a lower degree. The fontanelle remained open, the eyeballs were pushed downwards, so that the lower lid covered a portion of the pupil; there was no development of the intellectual powers. No doubt was entertained of the existence of hydrocephalus. Three weeks before death a new symptom occurred. There was convulsive action of both bulbs, which slid from side to side like the weaver's shuttle, the rapidity of the movement increasing as soon as the head was held in the erect position. Fever, sopor, instantaneous vomiting when the head was raised, and loss of sight supervened. Death ensued with violent convulsions, especially of the muscles of the eye. The post-mortem examination was made by Dr. Henle, at that time prosector at the university dissecting-rooms, and exhibited a brain that was much developed and might almost be termed hypertrophic; its consistency was dense and elastic. All the ventricles were distended to double their ordinary size, and filled with a reddish serum. There was a considerable plastic exudation at the base of the brain, pressing upon the chiasma of the optic nerves. The oculomotor nerves were imbedded in a gelatinous mass which adhered to them so closely that they could not be perfectly dissected out.

Strabismus occurs under similar circumstances, and associates itself with convulsive affections of other nerves, which are irritated at the base of the brain by an inflammatory process occurring in the meninges. The following case, which recalls to my memory a cure effected under very unfavorable circumstances, shows how the symptoms occurred in the order in which the nerves are gradually drawn within the circle of irritation.

A boy of 3 years, plethoric, and endowed with a large head and a short neck, was attacked, in August, 1833, with croup, which was removed by the early administration of the appropriate remedies. Six weeks later the usual good spirits of the boy disappeared, and there was a dislike to standing or walking, and frequent complaints of pains in the feet. Restless nights and febricitation supervened. On the 30th September violent convulsions and unconsciousness suddenly occurred, for which a medical man, who was called up from the street, ordered a warm bath and musk. When I arrived, an hour later, I found the child in an apoplectic condition; the face was crimson, there was sopor, stertor, steaming skin, and a full frequent pulse. I ordered leeches, cold to the head, and copious derivation to the intestinal canal. The sopor yielded to considerable excitement and loud confused talking; the presence of vertigo was manifested by the constant cry—"I am falling off my chair!" The continued use of calomel, repeated abstraction of blood, cold affusion to the head, and a blister to the back of the neck, overcame the phrenitic condition, &c.; but in its place a state of unconsciousness and sopor supervened, which for twenty-eight days formed the background of convulsive scenes which were remarkable on account of the successive affection of the nerves seated at the base of the brain. At first the vagus was involved, and there was short dry cough, with suffocative attacks; then the facial nerve became implicated, as shown by the forcible expansion and contraction of the nerves and by distortions of the angles of the mouth; then the fibres of the fifth distributed to the muscles of mastication were involved, and there was a persistent chewing movement; after that amaurosis followed: when a lighted candle was held before the eyes or the finger moved close to them, there was no winking or other movements of the eye, although the pupils continued to act pretty well: lastly, the oculomotor became affected, and there was marked strabismus inwards and upwards. The other symptoms of meningitis continued all the time; sopor, inability to hold up the head, jactitation of the head and burrowing into the pillow, circumscribed redness of one cheek appearing and disappearing, grunting expiration, extension of one leg, raising and swinging the leg however often it was put back under the bed-clothes, extreme emaciation, especially of the neck and back, falling in of the abdomen so that the ribs projected considerably, a dry, harsh skin, irregular breathing, a pulse of from 100 to 112 beats, and great torpidity of the intestines. It was in this case that the continued employment of moist warmth, by means of fomentations of the head, produced the most satisfactory results, which I have since found confirmed in several cases.[1]

The reflex influence upon the origin of spasm of the eye manifests itself when sensory nerves in the vicinity, or at a distance, are irritated. Thus it sometimes occurs when the eye is mechanically injured; and Jüngken[2] describes a spasmodic affection accompanying lacerated and contused wounds of the eyeball, by which the latter is drawn into the orbit, occasionally with such force that the conjunctiva forms a fold over the ball and that the cornea disappears altogether. The squinting that occurs at the periods of dentition affords a proof of the reflex action exerted by the fifth pair upon the motor nerves of the eye. Intestinal irritation, especially when produced by worms, is liable to give rise to strabismus. Nor is it an unusual occurrence in hysteria, where we find the external rectus chiefly affected; and it is this which, in a mild degree, is termed the false eye. Böhm had an hysterical patient under his care, in whom the spasmodic reflex actions, commencing at the feet, travelled through all the different groups of muscles, induced various distortions of the body, then attacked the face, and finally settled in the ocular muscles. For a long time there was strabismus convergens alternately on the right and left sides, the pupil in each case being so concealed in the inner canthus, that light only entered in at a small portion. The patient, who was perfectly conscious throughout, only complained of one inconvenience; as the associated movements of the eye continued, all objects to which she directed her undivided attention appeared double. The more distant the object, the further the double images were apart, and the less they annoyed her.

---

[1] See Dr. Romberg's—Diagnostische und Therapeutische Bemerkungen über Hirnentzündungen im kindlichen Alter, in Casper's Wochenschrift für die gesammte Heilkunde; Jahrg., 1834, p. 499.

[2] Die Lehre von den Augenkrankheiten, 2 Aufl., p. 890.

The optic nerve is in a close reflex relation to the nerves of the ocular muscles; and the balance of the movements of the eyes is determined by condition of this relation. Thus we find a restless movement of the eyeball, accompanying an early interruption to the functions of the retina; nystagmus is the ordinary accompaniment of the congenital cataract, as well as of extensive leucoma, or staphyloma, resulting from ophthalmia neonatorum and ophthalmia variolosa. Minor opacities of the cornea or the lenticular capsule, give rise to strabismus convergens, while strabismus divergens is induced by paralysis of the retina in amaurosis. Spasmodic strabismus may also arise from causes affecting the energy of the optic nerve. A patient of 30 years of age, informed me that the squint with which she and her brother were affected, had supervened suddenly, when she was five years old, in consequence of her being brought out of a dark room into one brilliantly illuminated, on Christmas eve.

Among the exciting causes proceeding directly from the brain, those of a psychical character are the most frequent; emotions induce spasmodic squinting, and they may excite it in individuals in whom other predisposing influences may have caused a tendency to strabismus. Böhm, to whose work we must refer the reader for a fuller consideration of the subject, remarks:

"Individuals of this character, who do not excite any, or but trifling suspicion, even in an experienced observer are suddenly seized in a most remarkable manner, with the highest degree of one-sided strabismus, whenever they are vividly reminded of any deeply interesting subject, or they reflect vividly, or their emotions carry them out of their usual frame of mind, and embarrassment, mauvaise honte, shame, fear, or anger excite their central nervous organ." And again: "It appeared to me to be important to ascertain from the patients themselves whether, and in what manner, they were able to diminish or avoid the irregular position of the eyes, in order to determine more accurately the nature of the mental influence in squinting. Individuals accustomed to reflection were competent to return an answer to the inquiry. They state that they are conscious of not possessing a direct controlling power in this respect; but that they are able to restore the eye indirectly to parallelism, in proportion to the facility with which at any given time they can regain perfect mental equanimity. With the view to avoiding the squint, they actually try, at times, to divert their thoughts, to turn a conversation which excited them into another, calmer channel, and the like."

The observations made in idiots offer an especial interest. Böhm, who was physician to an asylum for these unfortunate individuals, had many opportunities of watching them in their leisure hours, and invariably found their eyes straight; in a few only there was continued and permanent strabismus. He was, therefore, much surprised, when he first had occasion to observe them at their lessons, and saw that soon one and then another showed an egregious squint. This evidently occurred at such periods at which the visual impression passed beyond the boundary of mere sense and an inner perception commenced, the clearness of the mental act still, however, meeting with great impediments. In accounting for this phenomenon, we can scarcely refuse to admit that these difficulties predominated in one half of the brain, and that the squint occurred as a symptom of the internal process, which to us undoubtedly is obscure, but which it is not unreasonable to suppose connected with a different state of irritability in the portion of the brain less accessible to mental operations, which might cause an abnormally increased influence upon the motor nerves of the corresponding eye. This explanation is the more tenable, as the temporary squint of idiots occurs simultaneously with the first dawn of intellectual activity, so that Böhm was enabled by this symptom to judge of the exact point which the pedagogic influences had reached. In the same way as the brain increases in vigour, and the intellect is expanded, (*e. g.* from the low state of development in which they are capable of only emitting a few sounds, to the capacity of reflecting and conversing,) the squint becomes less frequent, and generally disappears in the course of time.

It has not as yet been determined whether morbid states of certain portions of the brain are followed by squinting, as in the case of injuries in living animals. In the experiments made by Krauss, Hertwig, Magendie, Budge, and others, lesions of the cerebellum, the peduncula cerebelli, the pons Varolii, and the processus restiformes of the medulla oblongata, the eye of the same side was found to squint downwards and upwards, while the eye of the opposite side was rotated backwards and upwards, a phenomenon which is probably connected with the altered balance of movements caused by such injuries.

The type of spasmodic strabismus is, at times, of an uniform and constant character, as seen by Böhm in two instances. In one, that of a boy of 5 years, a quartan ague had preceded; at first, the strabismus took the place of the febrile paroxysm, after a few weeks it assumed the tertian, and subsequently the quotidian type. In the free intervals by day and at night, there was no trace of disturbed equilibrium. In the other case, which occurred in a child of 3 years old, the squint returned for several months, regularly on alternate days, and gradually disappeared; the squint still continuing for a time to manifest itself momentarily on the paroxysmal days; it was produced by slight emotions, as by the shyness caused by the appearance of a stranger, or when the child was out of temper, and this too ceased entirely after a time.

In choosing our treatment the cause of the affection must determine our selection. The spasm of the eyes depending upon intestinal or dental irritation, generally disappears with the removal of these conditions. In a boy, aged 12 years, the discharge of a quantity of ascarides and some lumbrici removed a nystagmus under which he was suffering. Inflammatory affections of the base of the brain require the treatment appropriate to them. The contraction of the squinting muscle induced by spasm demands surgical interference, and calls for myotomy or tenotomy.

CHAPTER VII.

SPASM IN THE MUSCULAR DISTRIBUTION OF THE NERVUS ACCESSORIUS WILLISII, AND OF THE SUPERIOR CERVICAL NERVE.

Experimental results.—Irritation of the accessory nerve at its entrance into the foramen lacerum in a recently-killed animal, causes contraction of the sterno-cleido-mastoid, and trapezius muscles.[1] These muscles, both or singly, (in the latter case more frequently the sterno-cleido-mastoid,) may be attacked with spasm; the older writers (Wepfer, Sauvages,) relate cases of the kind, but we owe a more accurate knowledge of the subject to the researches of Bell.[2]

The head is rotated in paroxysms obliquely to one side, either suddenly at once, or in short successive jerks, to such a degree that the ear is brought close to the shoulder, and the chin is elevated in the opposite direction. The sterno-cleido-mastoid muscle of the side to which the head is drawn down bulges out, and is tense. At times the head is bent more backwards, and the shoulder is raised, showing an affection of the trapezius, which may be felt as a hard cord. In most cases pain in the course, or at the insertions of the muscle, or at the nape or occiput of the affected side, accompanies the spasm. After a brief duration, generally but of a few seconds, the head resumes its normal position, in order soon again to quit it. By fixing the head and neck the patient is generally enabled to prevent the spasm, and even to arrest it after it has commenced. Occasionally he is even able to do it without such support. Bell[3] relates that a patient of his was able, when the paroxysm attained its climax, and the mastoid process had been drawn down to the sternum, voluntarily, though only for a short time, to relax the muscle, and to maintain the head in equilibrium. During sleep the paroxysms generally intermit.

---

[1] Volkmann; loc. cit., p. 498.

[2] The Nervous System, 3d ed., pp. 415—423.

[3] Loc. cit., p. 415, Case CLX.

Besides the muscles mentioned there are others, as the splenii and obliqui capitis, which, receiving their motor power from the superior cervical nerve, are sometimes affected with the spasm, and cause a rotatory or oscillatory movement of the head and neck. Bell communicates a case in point, of a young girl whose head was rotated constantly day and night, and turned twenty-two times in a minute. The action producing this movement resided in the sterno-cleido-mastoid, trapezius, and splenius muscles, affecting alternately each side, and turning the head on the odontoid process of the second vertebra, as regularly as if it moved in obedience to a pendulum. I have observed a similar affection in a girl of 14 years, who enjoyed good health up to her eleventh year, and was then seized with histrionic spasm of the face. This gradually subsided, and for it a convulsive oscillation of the head, chiefly to the left, and less frequently forwards, was substituted. In fifteen seconds, I counted eleven gyrations of this character, which ceased altogether during sleep. In another case, the rectus capitis anticus seemed mainly affected; it occurred in an infant of six months, which had laboured under watery diarrhœa, heat of the mouth and head, and after these symptoms had disappeared, was attacked with a permanent swinging of the head forwards, like the Chinese idols. At times, especially when she woke up, the eyeballs were rotated upwards; during sleep the spasm was arrested, and it also ceased during waking, as soon as the child's attention was attracted to anything. Forcibly holding its head still, created restlessness and crying.

As a result of enduring spasm we meet with hypertrophy of the muscles, distortions of the face, descent of one side of the face, while the opposite one is drawn up, and even with dislocation of the bones of the face.[1] When the scaleni are implicated, I have occasionally, from compression of the brachial plexus, found numbness and anæsthesia ensue, as well as œdema from compression of the veins.

---

[1] Dieffenbach; über die Durchschneidung der Sehnen und Muskeln; Berlin, 1841, p. 24.

The convulsive affection of the accessory either occurs by itself, or in combination with other spasms; in this case, the muscles of the face, as also of the pharynx and the larynx, are most commonly affected.

The causes are obscure. In a few patients only, the origin was referable to violent bodily fatigue which had preceded to lifting a heavy weight, accompanied by a sense of cracking in the back of the neck, to a heavy labour, and the like. Others referred it to violent emotions, debilitating influences, draughts impinging on one side of the neck,[1] and rheumatic influences generally; the majority of patients, however, were unable to state any etiological moment with certainty, and described the spasm as occurring gradually. In the case of an old lady of 73, communicated by Stromeyer,[2] the spasm was associated with an extreme tension of the muscles of the calves, giving the feet the form of pes equinus; there had also been, for a series of years, a slight spastic contraction of the sphincter ani. Brodie[3] has observed a woman, in whom the spasm after a year's duration suddenly ceased, upon which insanity occurred, which also lasted one year. With the cure of the latter the spasm returned. The case of the child above alluded to proves that dentition may prove an exciting cause. Lukewarm baths and purgatives produced no effect; but after the cramp had lasted three months the child cut its first incisor, it then at once remitted, and ceased entirely after a week's time.

The treatment hitherto adopted for this spasm has been unsuccessful: it would therefore be useless to enumerate all the remedies to which recourse has been had without any definite indication. In one case, Bright obtained a permanent cure by the exhibition of large doses of carbonate of iron (two and a half drachms) and by applying a moxa to the nape of the neck. In the case of a girl of 14 years of age, observed by myself, increasing doses of the sulphate of zinc were followed by a satisfactory result. In another inveterate case, electricity, in the shape of sparks drawn from the nape of the neck, produced a good effect.[4] Even the division of the branches of the accessory, as attempted by Dr. Bujalsky, of St. Petersburg, and reported by Stromeyer,[1] was not followed by any permanent results; nor is it an operation that deserves to be repeated, as, independent of the great difficulty of the operation in the living subject, besides the accessory nerve, branches of the cervical nerves are distributed to the sterno-cleido-mastoid, the affection of which would be liable to predominate. A happier result is likely to attend the division of the affected muscle, which has been executed by Stromeyer and Amussat with permanent results, although even here at times obstacles present themselves to the recovery. Thus, I have met with one patient, who was affected with this spasm in an intense degree, and in whom the repeated division of the sterno-cleido-mastoid by Professor Dieffenbach was utterly ineffectual.

---

[1] [illegible] Reports, &c. [illegible] p. 500.

[2] Beiträge zur operativen Orthopädik, p. [illegible]

[3] Lectures illustrative of certain Local Nervous Affections, p. 8.

[4] [illegible] Reports, [illegible] p. [illegible]

The permanent contraction of the sterno-cleido-mastoid and the trapezius (caput obstipum spasticum) is generally a symptom of inflammatory affections of the cervical vertebræ, and more frequently attacks the right than the left side. The tenderness of the cervical vertebræ to the touch, and the violent pain brought on by attempts to place the head in the straight position, are pathognomonic of this state of things. As the disorganising process advances the tonic spasm ceases, passes into paralysis, and the muscles of the opposite side now acquire the upper hand. If the inflammatory affection of the vertebræ is attended to in good time, and overcome by the local abstraction of blood, issues, and the administration of alterative medicines, the torticollis will disappear spontaneously.[2]

---

[1] Loc. cit., p. 140.

[2] See Stromeyer; loc. cit., pp. 147—150.

The convulsive affection of the accessory either occurs by itself, or in combination with other spasms; in this case, the muscles of the face, as also of the pharynx and the larynx, are most commonly affected.

The causes are obscure. In a few patients only, the origin was referable to violent bodily fatigue which had preceded to lifting a heavy weight, accompanied by a sense of cracking in the back of the neck, to a heavy labour, and the like. Others referred it to violent emotions, debilitating influences, draughts impinging on one side of the neck,[1] and rheumatic influences generally; the majority of patients, however, were unable to state any etiological moment with certainty, and described the spasm as occurring gradually. In the case of an old lady of 73, communicated by Stromeyer,[2] the spasm was associated with an extreme tension of the muscles of the calves, giving the feet the form of pes equinus; there had also been, for a series of years, a slight spastic contraction of the sphincter ani. Brodie[3] has observed a woman, in whom the spasm after a year's duration suddenly ceased, upon which insanity occurred, which also lasted one year. With the cure of the latter the spasm returned. The case of the child above alluded to proves that dentition may prove an exciting cause. Lukewarm baths and purgatives produced no effect; but after the cramp had lasted three months, the child cut its first incisor, it then at once remitted, and ceased entirely after a week's time.

The treatment hitherto adopted for this spasm has been unsuccessful; it would therefore be useless to enumerate all the remedies to which recourse has been had without any definite indication. In one case, Bright obtained a permanent cure by the exhibition of large doses of carbonate of iron (two and a half drachms) and by applying a moxa to the nape of the neck. In the case of a girl of 14 years of age, observed by myself, increasing doses of the sulphate of zinc were followed by a satisfactory result. In another inveterate case, electricity, in the shape of sparks drawn from the nape of the neck, produced a good effect.[4] Even the division of the branches of the accessory, as attempted by Dr. Bujalsky, of St. Petersburg, and reported by Stromeyer,[1] was not followed by any permanent results; nor is it an operation that deserves to be repeated, as, independent of the great difficulty of the operation in the living subject, besides the accessory nerve, branches of the cervical nerves are distributed to the sterno-cleido-mastoid, the affection of which would be liable to predominate. A happier result is likely to attend the division of the affected muscle, which has been executed by Stromeyer and Amussat with permanent results, although even here at times obstacles present themselves to the recovery. Thus, I have met with one patient, who was affected with this spasm in an intense degree, and in whom the repeated division of the sterno-cleido-mastoid by Professor Dieffenbach was utterly ineffectual.

---

[1] Bright's Reports, &c., vol. ii, p. 500.

[2] Beiträge zur Operativen Orthopædik, p. 146.

[3] Lectures illustrative of certain Local Nervous Affections, p. 8.

[4] Guy's Hospital Reports, vol. vi, p. 94.

The permanent contraction of the sterno-cleido-mastoid and the trapezius (caput obstipum spasticum) is generally a symptom of inflammatory affections of the cervical vertebræ, and more frequently attacks the right than the left side. The tenderness of the cervical vertebræ to the touch, and the violent pain brought on by attempts to place the head in the straight position, are pathognomonic of this state of things. As the disorganising process advances the tonic spasm ceases, passes into paralysis, and the muscles of the opposite side now acquire the upper hand. If the inflammatory affection of the vertebræ is attended to in good time, and overcome by the local abstraction of blood, issues, and the administration of alterative medicines, the torticollis will disappear spontaneously.[2]

---

[1] Loc. cit., p. 140.

[2] See Stromeyer; loc. cit., pp. 147—150.

CHAPTER VIII.

SPASM IN THE RANGE OF THE MOTOR NERVES OF THE UPPER EXTREMITIES.

Spasmodic movements or positions of the upper extremities are rarely brought on by irritation of the brachial plexus; they are generally the result of affections of the central organs. A peculiar form of local spasm in these parts has, however, recently been made known under the name of the Writer's Cramp. In this affection every attempt to write instantly calls forth spasmodic movements in the thumb, the index and middle finger, so that the pen starts up and down on the paper, and instead of a legible handwriting a mere scrawl results. Canstatt[1] distinguishes between a writer's cramp of the flexors and extensors. The more the patient persists in his attempt, the more the difficulty of using his pen increases, and to the visible and sensible contractions of the muscles of the thumb, contractions of the forearm, and even of the upper arm are often superadded, as I have myself lately had occasion to observe. Abnormal sensations, especially a sense of weight, and constriction of the hand, or of pain extending from the upper arm to the back, are occasionally present. It is diagnostic of these attacks, that they are instantly arrested when the individual ceases writing; and that the hand is capable of every other combination of movements and exertions. Even if the complaint is persistent for a length of time, no other disturbances in the nervous functions of the arm present themselves. Hitherto the writer's cramp has almost exclusively been met with in the male sex; I have only heard of a single instance occurring in a female. The early period of life appears to be exempt. An occupation entailing much writing predisposes to the affection. No other etiological relations of the writer's cramp, to which Brück[2] has been the first to draw attention, have been ascertained.

---

[1] Die Specielle Pathologie und Therapie, vol. iii, p. 313.

[2] Casper; Kritisches Repertorium, 1831, vol. xxx, II, 1.

The act of writing is a result of an effort of intelligence and motility, and may be variously impaired by a disturbance of either. In dementia, acquired idiotcy, the patient is not able to write his own name; the first letters are legible, but then follow irregular scrawls; the unconnected appearance of the writing corresponds to the state of the thoughts, which are equally irregular. On the other hand the function of motility is at fault, being either diminished or exalted. Paralysis of the upper extremity, dependent upon a cerebral or spinal affection, frequently commences with impaired power of conduction in the motor nerves of the fingers, and consequent difficulty of writing: a man was under my care whose disease lay in the cerebellum, and made its debut with an impediment in writing. This paralytic incapacity was not, however, confined to writing, but interfered with every other kind of manual occupation, as is the case in tremor manus; nor is there in these paralytic affections the sensible contraction of the individual muscles of the fingers, and the diagnosis is further facilitated by the presence of other symptoms. The latter is particularly the case when a centric affection commences with spasmodic contraction of the muscles. Thus, some time back a man of 43 years of age presented himself among the outpatients of the hospital, who, in consequence of a severe cold, had suffered from violent pains in the right shoulder joint, extending down to the hand, where they caused a sensation as if the tendons were too short. Frequently on attempting to write, cut his pen, or seize small objects, for instance, a needle, contractions of the fingers ensued and prevented his carrying out his intentions. The pains in the shoulder increased with changes in the weather. They were relieved by anti-rheumatic remedies, but after a few months a sense of numbness in the right ear, going to sleep and dragging of the left leg, and stammering supervened, so that a disease of the right hemisphere of the brain was assumed to exist. I have met with another similar case, in which, however, the course of the disease proved that it had a peripheral origin. The patient, a man of 53 years, had for three years suffered from violent rheumatism in the right shoulder joint. It gradually disappeared, and left a marked weakness of the right hand, which particularly interfered with the flexion of the fingers; at the same time there was a dull pricking sensation at the tip of the thumb and the first and second finger. Whenever the patient made an attempt at writing, the pricking extended up the forearm, and combined itself with jerking contractions of the hand and forearm muscles, which prevented the continuance of writing. Considerable sedimentation in the urine, and copious acid perspirations proved the continuance of the rheumatic diasthesis. Frictions of the arm with the oleum terebinthinæ æthereum, and a course of twenty-four Russian baths, with the application of the cold douche to the affected extremity, restored the patient to perfect health.

In the writer's cramp it is characteristic that the movements of the fingers preserve their integrity with regard to every other species of occupation; although we must not overlook a case described by Stromeyer,[1] in which an attempt to play on the pianoforte caused the thumb, with the second phalanx completely flexed, to be immediately drawn under the hand. I may remark that cramps of the fingers in other occupations have not met with the attention they deserve. Some time ago a smith, aged 37, came under my notice, who applied for relief at the hospital, for a rigid contraction of the muscles of the forearm, occurring whenever he took hold of the handle of his hammer, and wanted to fetch a blow; it was accompanied with violent pain, and the tense muscles were said to project like cords under the skin. This cramp had prevented him from attending to his business for the previous six months. All the other movements of the arm were unimpaired, nor did the motor or sensory functions of the arm show any other deviation from the normal standard. A violent concussion of the arm was stated to have given rise to the complaint in the first instance. The most energetic remedies, and at last the continued application of electro-magnetism produced no effect, so that the patient was forced to abandon his trade, and to occupy himself with painting doors and windows, the handling of the brush not causing any inconvenience.

It would appear from the above, that the peculiar position of the fingers in certain manual occupations, itself initiated with ease by an effort of the mind, and even maintained for a while, acts by reflex irritation, and destroys the co-ordination of the nerves and the association of the muscles, by a spasm. In the first edition of this book, I assumed that other influences, such as the quality of the paper or of the pen, might operate in the production of the writer's cramp; the following observation proves that this is not the case. A boy of 8 years had for six months been affected with a convulsive extension of the fingers of the right hand, rendering the hand so stiff that it could not be bent. The paroxysms were accompanied by a pricking sensation extending upwards to the elbow, and they recurred from five to eight times daily, and lasted several minutes each time. The left arm was subsequently affected in the same manner, and after this epilepsy was fully developed, the approach of which affection had been predicted the first time the boy was presented to the students, the spasm being viewed as an aura. Among the exciting causes none brought on the paroxysms so frequently as an attempt at writing; a rigid contraction of the muscles of the thumb at once ensued, by which the limb was crossed over the hollow of the hand. The contact of the pen had no influence, for the same phenomenon occurred when the boy, without taking hold of a pen, placed his fingers in the position necessary for writing, whether he rested his hand on the paper or figured the letters in the air.

---

[1] Ueber den Schreibekrampf, in—Medicinisches Correspondenzblatt Baierischer Aerzte, 1840, No. 8, p. 117.

In speaking of this obscure affection we may also allude to the fact that some persons are liable to feel slight shocks, resembling electric discharges, in their fingers while they are writing. Professor Müller[1] states that at a time when he was suffering under nervous irritation, he frequently presented this symptom whenever he had over-exerted his hand and fingers.

The *treatment* hitherto pursued, both local and general, has been invariably ineffectual, so that the patients generally ceased from all attempts at cure, and remained satisfied with mechanical contrivances, the object of which was more or less to cause a pressure upon the skin and the subjacent muscles. Stromeyer[2] also applied the principle of division of the muscles to the cure of the writer's cramp, and in one case a brilliant result justified the antispasmodic reputation of tenotomy. As early as the fourteenth day after the subcutaneous division of the tendon of the flexor longus pollicis, the patient was perfectly able to resume his pianoforte playing, and to write. On the other hand it is to be observed that the operation was perfectly ineffectual in several patients upon whom Dieffenbach operated.

---

[1] Elements of Physiology, Dr. Baly's Translation, vol. i, p. 640.

[2] Loc. cit., p. 118.

After amputation or fracture the injured limb (an arm or a leg) is occasionally attacked with spasms, which are either caused by direct injury of the motor nerve, or by reflex action. Thus Dr. Babington[1] relates the case of a woman, aged 20, whose right arm was amputated on account of scrofulous disorganisation of the elbow-joint. Three months later she complained of the stump starting up in her sleep; it soon began to move constantly to and fro, in alternate abduction and adduction. While the patient slept, the movement was limited to a mere tremor. The treatment was ineffectual.

---

[1] Guy's Hospital Reports, vol. vi, p. 423.

CHAPTER IX.

SPASM IN THE RANGE OF THE MOTOR NERVES OF THE INFERIOR EXTREMITIES.

THE seat and cause of the affection induce various modifications in the phenomena accompanying it.

Among the muscular nerves of the thigh, the branches of the first and second lumbar nerves, which are distributed to the flexors, the psoas and iliacus, are the more frequent seat of the spasm, and cause the spasmodic contraction of the hip, the diagnosis of which disease has been determined by Stromeyer's investigation. The extremity is bent at the hip-joint, and is incapable of being extended. Attempts at extension excite violent pains in the knee. The tendons of the psoas and iliacus, and the muscles themselves, project in dense ridges; touching them increases the pain in the knee. The hip is drawn up by the action of the quadratus lumborum and the abdominal muscles, so as to induce an apparent shortening of the extremity, from the tip of the affected foot only touching the ground in walking.

Spasm rarely attacks the muscles that move the leg, and cause extension or flexion of the knee; but it is frequently seated in those filaments of the sciatic nerve which supply the triceps extensor cruris, and sometimes also in those of the tibialis muscle, with or without an alteration in the form of the foot. In the former case, pes equinus or varus is produced, the spasmodic character of which is most distinctly manifested when the club-foot occurs periodically under certain conditions. A few cases of this kind are contained in the works of Stromeyer and Dieffenbach, and possess too great importance in reference to pathology not to be detailed here. A man, aged 30, had been affected with club-foot shortly after he first learned to walk, without any appreciable cause; in walking he only rested upon the outer edge; but when he sat, the foot could be almost reduced to the normal position, even when the knee was stretched, but still more easily when it was bent. As soon as he attempted to step, the sole of the foot was turned inwards, and violent pain ensued. In a child of a year and a half, the right foot in walking took the shape of pes equinus, while in sitting and lying no deformity whatever could be discovered. The pointing of the foot showed itself in the first attempts at walking.[1] A robust youth of 15, one day mounted upon a table to set the clock; on jumping off backwards on to the ground, the toes came first in contact with the floor, and he at once experienced a sharp pain in the heel, so that he could no longer use the foot. Frictions with oil relieved the pain after a few days, but on again attempting to walk, only the toes touched the ground; the heel was drawn up two inches, and even the entire weight of the body was insufficient to press down the heel. While sitting, the young man could place his foot in any position he chose; and this, as appeared at first, only because in bending the knee joint, the calf was relaxed and elongated. But on close examination, a different rationale was discovered. When the patient lay on his back, so that the knee joint and the muscles of the calf were relaxed, he was able to effect every movement with the metatarsal joint; to extend, adduct or abduct the foot. It is consequently a matter of physiological interest to observe, that when the gastrocnemii were inactive, they could be extended by the flexors; and that, in the erect posture, the gastrocnemii, notwithstanding the weight of the body resting upon the foot, were shortened as much as two inches. Mr. von J., aged 22, a student of philosophy, robust and in florid health, was attacked in his early youth with a debility of the lower extremities, rendering locomotion difficult. Strengthening baths and spirituous lotions were the remedies employed at the time. The examination of the extremities showed no difference either as to form or nutrition. In the sitting posture both feet were perfectly well formed, and the young man was able to make any movement with facility; but if he rose and walked, his gait was insecure, tottering and waddling, resembling the movements of a person upon polished ice with smooth boots. His walk became more irregular when he took off his boots and stockings, and walked barefoot through the room; he was then often obliged to support himself, to prevent his falling. If he placed his feet on the ground, their form was normal; but, as soon as he rose from his chair, and the feet had to bear the weight of the body, they instantly assumed the shape of splay feet, the arch of the sole disappeared, the toes contracted, and were raised with the front of the foot, so that the dorsum of the foot presented a concavity.[1]

---

[1] Stromeyer; loc. cit., pp. 83 and 95.

[2] Dieffenbach; Ueber die Durchschneidung der Sehnen und Muskeln, p. 225.

Spasm of the muscles of the calf occurs more frequently without alteration of the shape of the foot; it results from irritation of the sciatic nerve, and is accompanied by intense pain.

Peripheral, as well as reflex, irritation may induce the complaint. Morbid processes of the vertebræ, especially of the lumbar region, are not unfrequent causes of the former class, and they give rise to contraction of the hip-joint, in the same way as disease of the cervical vertebræ originates the caput obstipum. The abdominal organs may also implicate the lumbar and sacral plexuses directly, an instance of which is afforded by the pregnant uterus. Their influence is, however, more frequently one of a reflex character; thus spasm of the muscles of the calves is associated with dysentery, and the coincident occurrence of spasm in the extensors of the fingers is a further evidence of its being due to reflex irritation. Intestinal irritants of a different kind may operate in an analogous manner. We must not overlook the irritation proceeding from the womb. The hysterical affections of the joints described by Brodie[2] may probably be referred to this source. Thus Andral relates the case of a girl, of 19 years, whose menstrual period was suddenly arrested by a fright, and was afterwards affected regularly, at the time at which the menses should have appeared, with spasmodic contraction of the inferior extremities. The leg was flexed to such a degree that the heels touched the nates. During the intervals her health was undisturbed, and on the restoration of her courses the convulsions ceased. The cases of periodic club-foot which have been related, direct the attention to the skin. This generally, and especially the cutaneous coverings of the sole, must be looked upon as a great source of reflex irritation:

---

[1] Dieffenbach; loc. cit., p. 240.

[2] See pp. 64 and 74.

the mere contact of the sole with the ground, particularly when bared, is found to excite an attack of spasm. Brodie[1] has often observed that in the hysterical affections of the joints, to which he has drawn attention, a gentle touch of the cutaneous coverings induced convulsive movements of the leg, which at times became so violent, as to throw up the thigh, and occasionally to resemble chorea. Twitchings and contractions of the muscles of the lower extremities are occasionally met with as symptoms of centric disease of the spinal cord, though not so frequently as paralysis.

Our treatment is often crowned with brilliant results if we attend to the course. Such is the case in spasmodic contraction of the hip-joint, dependent upon a disease of the osseous tissue of the lumbar vertebræ. The accurate examination of the spine will prevent this error, and direct the application of derivatives (issues and inunction, with tartar emetic) to the proper locality. Removing the intestinal and uterine irritation affords permanent relief to the cramps of the calves. In spasmodic clubfoot the treatment formerly adopted was of no avail. In the cases above quoted cures were obtained by tenotomy and myotomy.

Among the spasmodic affections of the extremities there is one which has attracted some attention in modern times, and, from attacking both hands and feet, has been termed carpopedal convulsion. It is met with mainly during the first three years of life. The fingers are bent across the hollow of the hand, with the thumb underneath them; the latter is rarely affected alone; at times the entire hand is flexed inwards. An attempt at extension creates pain. In some cases a trifling tumefaction and reddening of the hand and the fingers has been observed. The feet suffer in a like manner, but only in company with the fingers, and not by themselves. The toes are doubled inwards, the big toe being generally abducted and the rest rigidly extended. The spasm occurs periodically, or [illegible] for days and weeks. There are no other symptoms of an affection of the brain or spinal cord, a circumstance which has induced some modern French writers to look upon it as an idiopathic contraction of the muscles.

This spasm generally accompanies other and especially intestinal affections, from which it originates by reflex irritation. Thus it also occurs during dentition, by itself or associated with spasm of the glottis.

---

[1] Lectures illustrative of certain Local Affections, p. 43.

The *prognosis* is favorable as to the issues of those spasmodic affections which are unconnected with cerebral disease; those of cerebral origin are generally unilateral. The *treatment* must differ accordingly; the fundamental disease must be attended to, and only when this has ceased, and the spasm still continues, anti-spasmodics, asafœtida, baths containing an infusion of valerian, should be employed. Whoever in such cases has recourse to abstracting blood, blisters, and debilitating remedies, must be held responsible for the injury which will ensue.

larynx of a recently killed horse, and observed that the muscle at once contracted, and the glottis was narrowed by the approximation of the arytenoid cartilages.

The spasmodic movements of respiration occur either in isolated acts, or associated in groups. The spasm of the glottis and bronchial spasm are the representatives of the former class.

SPASMUS GLOTTIDIS.

Asthma laryngeum.

Contraction of the muscles closing the rima glottidis causes an impediment to, or entirely arrests inspiration. There is no disease or injury of the larynx with which this affection may not be associated. As an idiopathic affection, which mainly occurs in early infancy, though not unknown to older authors, it has recently been described under various denominations, as asthma acutum Millari, asthma thymicum, spasmodic croup, laryngismus stridulus; we, however, prefer the name which heads this paragraph, as the most simple. Spasm of the glottis occurs in paroxysms of varying intensity, according as the glottis is partially or entirely closed. The milder attacks are characterised by a short attack of dyspnœa, difficult and often sonorous inspiration, as in apnœa, accompanied by restlessness and an anxious expression of the face; such attacks are at first often unnoticed, as the health of the child does not appear affected in the intervals. A trifling mucous rattle in the larynx sometimes precedes. In the more violent paroxysms the apnœa approaches to suffocation, and the respiration is interrupted for seconds, and even for one and two minutes. The eyes are wide open and staring, the face becomes livid or cadaverous, the alæ nasi and the muscles of the neck act violently, the arms are stretched out and rigid, asphyxia appears unavoidable when at last the air penetrates in jerks and with a sonorous tone, and the paroxysm closes with a fit of crying and sobbing. During its continuance the spasmodic contractions of the head and feet often occur, of which we have spoken at page 328; in a few instances they continue during the intermissions, or they alternate with the spasm of the glottis. The same applies to the general convulsions, which occasionally precede the outbreak of this affection. This was the case in a girl of fifteen months, who, in the month of February in 1846, was under my care as an out-patient of the hospital; some weeks previously it had passed through several attacks of eclampsia, which had left contractions of the upper and lower extremities. The forearm was bent upon the upper arm, and the leg upon the thigh, so that forcible extension was impossible; consciousness remained unimpaired. The contractions lasted four days, and then disappeared spontaneously. They were followed by attacks of spasm of the glottis, alternating with eclampsia. Small doses of calomel with rhubarb, baths, and enemata of asafœtida, produced a temporary alleviation of the symptoms. In March and June the same phenomena recurred with increased violence; then ceased until December, when the spasm and the eclampsia again alternated. The circumstance that an eruption of impetigo capitis during the summer had diminished the attacks, and the spontaneous disappearance of the cutaneous affections had been accompanied by a return of the convulsions, was used as a therapeutic indication, and the Unguent. Antimonii Tartarisati rubbed in partially in the hairy scalp. Since this time the spasms have not returned, and the child has grown up strong and healthy.

The attacks of spasm of the glottis occur more frequently by night, and on awaking from sleep, than by day. Sucking, deglutition, straining in defecation, a sudden movement, often produce them instantaneously. At times the reflex irritability is generally exalted; a slight touch or noise causing a start and the fit. Of the accompanying symptoms those of derangement of the digestive organs are the most frequent, such as constipation, an abnormal greyish yellow colour of the fæces, resembling putty, rarely diarrhœa, and accumulation of gases in the intestines.

The duration of the disease extends over several weeks and months, with intermissions of shorter or longer duration. It is only in very rare cases that recovery or death takes place during the first days of the illness. Among the predisposing causes, the first period of dentition exerts the greater influence. There are instances on record of its affecting children during the first few weeks of life; thus one of my own children was attacked with violent spasm of the glottis on the second day after birth, but it only occurred in a single paroxysm, and did not return. Others have observed it in the third and fourth year, but these are exceptions, the chief proclivity being manifested from the sixth to the fourteenth month. There can be no doubt of the existence of an hereditary predisposition; in many families several, and even all, the children, though they may have been differently brought up, both as to residence and food, are attacked with spasm of the glottis. In one family I attended two children who laboured under this complaint, (one of whom died,) after three other children of the same family had fallen victims to it. Reid[1] mentions one family of thirteen children, only one of whom escaped, and four died. The soil and the atmosphere exert some influence upon the origin of the complaint; thus it occurs more frequently in towns than in the country, and some towns, as London and Hamburg, are remarkable for the greater frequency of its occurrence than others, *e. g.*, Paris. Children brought up by hand appear to suffer more frequently than children who have been nursed at the breast. Weaning appears to favour the development and continuation of the disease. It may terminate in three ways: 1, in recovery, which is generally gradual; 2, in immediate death by asphyxia, the most violent efforts to breathe are fruitless, the head is bent backwards, the trunk is in a tetanic condition, and suddenly the child collapses, and has ceased to exist; 3, indirectly, in death by general convulsions and sopor.

The post-mortem examinations coincide as to the integrity of the larynx and trachea; as well as with regard to the changes induced by the asphyxia, consisting in congestion of the lungs, in the right side of the heart, and in the brain.

The paroxysmal character of the affection, and the calmness of the respiration during the fore intervals, suffice to distinguish it from croup and diphtheritic disease of the larynx. In the former there is no fever, and the voice is unaltered. Cough, the constant accompaniment of croup, is not observed during the attacks of spasm of the glottis, and is an accidental occurrence during the intermissions. Cramp of the toes and fingers are not seen as sequelæ of croup. In this disease the intensity and danger increase with every hour; in spasm of the glottis the climax is not attained for several weeks. It is also important to determine the diagnostic distinctions between spasm of the glottis and paralysis of the recurrent nerve. In the latter we also find attacks of dyspnœa increased to imminent suffocation, there is sonorous inspiration, but generally only with bodily exertion, when greater demands are made upon the organs of respiration, and in that case accompanied by noisy, hissing respiration, or a whispering hoarse voice, short cough, mucous rhonchi, insensibility of the trachea, and other symptoms, which will be found detailed in the second volume, in the chapter on Paralysis of the Vagus. The causes of this variety of paralysis, as, for instance, swelling and induration of the bronchial and cervical glands, or tumefaction of the thymus, are absent in spasm of the glottis; nor does dentition bear any definite relation to the former.

---

[1] James Reid, on Infantile Laryngismus; London, 1849, p. 19.

Hugh Ley committed an error in maintaining that the phenomena of spasm of the glottis depended upon a paralysis of the vagus. It was faulty physiology to assert that while the muscles, that open and dilate the rima glottidis, are deprived of their motor impulse, the antagonistic occluding muscles which are supplied by the superior laryngeal, overbalance them. The view according to which spasm of the glottis is brought on by a centric affection of the brain, is equally baseless. It gained some ground from the frequent association or succession of the spasms; but the integrity of the intellect in and out of the attacks, and the entire absence of cerebral symptoms in the course of the disease when uncomplicated, ought not to have been overlooked. The spasmodic respiratory movements, equally with the normal movements, are dependent upon the reflex action of individual nerves, or of whole groups of motor tracts; the exciting stimulus may reside in the vicinity of, or at a distance from, the motor nerve. With regard to the physiological argument, it is immaterial whether the contraction of the transverse and oblique arytenoid muscle is induced by a drop of water penetrating into the glottis, or by the irritation proceeding from a dental twig of the fifth pair, for in either case the centrifugal action is caused by a centripetal excitant; for the pathologist, however, a knowledge of the seat of the centripetal irritation is important, because, independently of the therapeutic interest that attaches to it, he will be enabled to estimate those diseases correctly with which spasm of the glottis is found to associate itself.

Life is endangered by suffocation or the supervention of eclampsia. Even if the attacks are not very intense, it is necessary to be careful; for the rima of infants, which is so small and narrow, often closes unexpectedly and suddenly. Richeraud was the first to determine that the larynx and glottis, which, in early life, are very small, suddenly increase at the period of puberty, in the male sex in the proportion of 5 : 10, in females of 5 : 7. Schlemm[1] has confirmed this observation, and has added a few details; thus he found the rima glottidis of a child of 12 years, one and a half to two lines longer than that of a child of 3 years, and in the latter it was three quarters of a line longer than in a child of nine months. This relation accounts for the greater danger of spasm of the glottis, and of laryngitis in infancy, as well as for the greater mortality in animals after division of the recurrent branch, the younger the animals are. Reid[2] has observed that children brought up by hand run greater risks than children who have been nursed. The risk of a relapse continues during the whole period of dentition.

The treatment of spasm of the glottis during the attack must be directed against the asphyxia; cold water should be thrown over the head, neck and face, cold air be allowed to play upon the face,—Reid recommends blowing at the child,—the præcordia be warmed with hot napkins; the feet may be wrapped in flannel steeped in a weak infusion of mustard, and enemata with an addition of asafœtida be exhibited. It has been proposed to give chloroform, but its effect upon the brain under such circumstances would probably render it unsafe. Nobody would attempt tracheotomy at the commencement of the attack, and if postponed too long no benefit can be expected from it. During the free intervals we must direct our attention to the cause. The first thing to attend to is the atmosphere and the diet. The advantage of country over town air, especially to persons residing in confined localities and ill-ventilated rooms, is undeniable. If the circumstances of the patient preclude the possibility of a change, the child should in mild weather be carried as much as possible into the open air. The infant should not be weaned during the continuance of the disease. It is important to avoid over-repletion, which is very apt to occur in hand-feeding; and when it has occurred it should be removed by emetics. The intestinal canal demands special attention; emetics, which are too apt to suggest themselves, only afford temporary relief. The best remedy for the constipation ordinarily accompanying the disease is castor oil, and if the evacuations show a deficiency of bile pigment, calomel should be exhibited. We should now have recourse to anti-spasmodic remedies, among which I give the preference to asafœtida; in four cases I have found the most beneficial results attending the administration to infants under a year, of equal parts of the aqua antihysterica fœtida and syrup; I gave it in doses of a teaspoonful four to six times a day.[1] I have found less benefit in the use of musk and ammonia, the latter given in the form of liquor cornu cervi succinatus.[2] Scarification of the gums, in England considered a panacea, has not met with much countenance in Germany, as the excitement produced by the operation in the child outweighs the possible advantages of the incisions. If apoplectic symptoms supervene, the local abstraction of blood is indicated, though much care should be observed in its administration, as it is apt to induce strangulation and death. When eclampsia supervenes, cold affusions of the head and back may be had recourse to; the not unfrequent presence of anæmia in children affected with spasms of the glottis, demands the continued exhibition of iron, which may advantageously be combined with small doses of rhubarb.

---

[1] Rudolphi; Grundriss der Physiologie, vol. ii, p. 344.

[2] Loc. cit., p. 101.

---

[1] [Aqua antihysterica fœtida sive Pragensis, a water distilled from asafœtida, galbanum, castoreum, myrrh, valerian, angelica; commonly given in hysterical affections, in doses of one drachm, every two hours.—Ed.]

[2] [The Liquor Cornu Cervi Succinatus, a succinate of ammonia, is prepared by dissolving an ounce and a half of succinic acid in a pint of water, and saturating it with the ammonium carbonicum pyro-oleosum, itself a sublimate of Carbonate of Ammonia with the Oleum animale æthereum.—Ed.]

CHAPTER XI.

SPASMUS BRONCHIALIS.

ASTHMA BRONCHIALE.

NOTWITHSTANDING Reisseissen's discovery of the presence of muscular fibres in the finest bronchi, where even the cartilaginous tissue has ceased to be discoverable, the capability of the bronchial ramifications to contract on the application of stimuli has been denied.[1] The experiments of Dr. Williams[2] have recently confirmed the existence of this function. Mechanical, chemical, or electric irritation gives rise to contraction which does not take place suddenly, as in a voluntary muscle, but is effected gradually, as in the intestines; it is exhausted by continued irritation, and is restored, even after the lapse of hours, if the lung be allowed rest, and even if it be removed from the body. It is diminished or destroyed by stramonium, belladonna, conium, strychnine, and morphia. Irritation of the vagus produces but a trifling effect; conducting the electric current through the pulmonary nerves produces much less powerful contractions than when it is conducted by the trachea. Longet[3] has observed that the application of mechanical or galvanic stimuli to the pulmonary branches of the vagus, gives rise to contractions in the bronchi of horses and oxen. Volkmann never succeeded in obtaining this result, though, in the following experiment, the motor influence of the vagus upon the lungs was directly manifested. A tube was fixed in the trachea of a decapitated animal, which was pointed externally, and was drawn out into a very fine orifice. If a candle was placed before this opening and the vagus galvanised, each irritation of the nerve gave rise to an instantaneous inflection of the flame, and on one occasion it was actually extinguished. The experiment also succeeds after the thorax has been opened, but the movements of the flame in that case are much weaker, because the lungs are collapsed, and contain little air. It deserves to be especially remarked that these movements occur in jerks. The lungs would scarcely be capable of executing such rapid movements if they were not required in daily life, and they cannot be supposed to serve any other purpose than that of rhythmical respiration.[1]

---

[1] Müller; Elements of Physiol., Dr. Baly's translation, vol. i, p. 346.

[2] Pathology and Diagnosis of the Diseases of the Chest, 4th ed.; London, 1840, pp. 320-331.

[3] Longet; Anatomie et Physiologie du Système Nerveux, 1842, vol. ii, p. 289.

The progress made in the knowledge of diseases of the lungs and the heart, has expelled the asthma convulsivum of the older nosologists from our present list of diseases, and in its place we assume organic alterations in the bronchial mucous membrane and in the heart. The distinction to be made between mere dyspnœa, which is nothing but an expression of the abnormal relation existing between the blood and the air in the lungs, and asthmatic attacks, has not been properly attended to, and this has only added to the confusion. Laennec, to whom we owe so much that is valuable, was the first to avail himself of his great discovery auscultation, in order to establish the contraction and dilatation of the minute bronchial ramifications by the disappearance and return of ordinary and puerile respiration in states in which every suspicion of a mechanical obstruction was avoided; it is in fact by auscultation that spasm of the bronchi receives its strongest confirmation.

The paroxysms, which are separated by free intervals, occur most frequently at night. They are either sudden or they are announced by oppression and distension of the epigastrium. The patient has a desire to fetch a deep breath, but he feels that the air does not pass beyond a certain point of his thorax. At this point hissing, piping, or purring râles are heard, both during expiration and inspiration, often even at a distance, and so as to be audible to the patient himself. The dyspnœa is augmented; the respiratory muscles, and especially the auxiliary groups, act violently; the alæ nasi are distended; the outlines of the sterno-cleidomastoids become prominent; the head is drawn back, and the patient rests his arms against a firm object in vain, to distend his thorax. The vesicular murmur ceases, and is here and there replaced by a sibilant râle, which appears and disappears suddenly, whilst the inspiratory murmur of the larynx and trachea continues not only undiminished, but even consonates more strongly. Anxiety is depicted in the countenance of the sufferer; the eyes are opened wide; a cold sweat covers the brow; the face becomes pallid; the heart beats violently, irregularly, and unequally, while the radial pulse is small and weak, and the temperature of the hands and cheeks is reduced. An attack of this description continues for a quarter of an hour, and may be prolonged for several hours, with short remissions. It then suddenly ceases; the air rushes violently into the bronchi and pulmonary vesicles, into which it had previously been precluded from entering, and a puerile murmur is produced; or else the remission takes place gradually, accompanied by eructations and yawning, or less frequently with cough, and an increase of secretion from the bronchial mucous membrane, with moist rhonchi, which persists for a time.

---

[1] See the article, Nervenphysiologie, in Wagner's Handbuch der Nervenphysiologie, 10 Lief., p. 586.

Such attacks occasionally recur with a regular type for a time, and even for weeks successively. They then cease, and a long pause follows, in which the patient enjoys perfect health.[1] The middle period of life, hæmorrhoids, arthritis, and albuminuria, predispose to the affection. We find that depletion of the stomach and intestines, and especially flatulence, as well as mental emotions and psychical affections, generally act as exciting causes. Laennec relates the case of a robust man of 82, who from his youth upwards had been subject to asthmatic affections, which only occurred rarely, but invariably supervened when the door of his bedroom was accidentally closed, or the night lamp was estinguished. It is commonly the case that the violence of asthmatic attacks is increased by darkness. Atmospheric conditions frequently exert an influence upon asthmatic patients. Some are affected by electric tension; others by attenuated, and others by a thick air. Cullen was already acquainted with the power which ipecacuanha possesses of inducing asthmatic paroxysms. An apothecary of this town has lately related to me, that whenever ipecacuanha is powdered in his yard, a bookseller's wife, who resides in the third floor of the house, is at once attacked with violent asthma, a fact which a medical man, in whose opinion I can place reliance, and who was called in during a paroxysm, has confirmed.

---

[1] Bergson; The Spasmodic Asthma of Adults, 1850, p. 40.

The *prognosis* of the affection depends upon whether the bronchial spasm occurs in the isolated or complicated form. A fatal issue by asphyxia is not to be feared, as in spasm of the glottis; let the symptoms be ever so imminent, there is scarcely ever any danger of suffocation in simple bronchial spasm. The disease is very tenacious, and extends over a series of years. Floyer, whose work on asthma (London, 1698,) made a great noise at the time it appeared, could not remember the time when he was first attacked, and he attained his 80th year without suffering any interruption in his career.[1] Nevertheless, when the paroxysms are very frequent, the effect necessarily exerted upon the constitution of the blood should not be overlooked.

In the *treatment* of the fit itself, opium occupies the first rank. The patient who has once tried its efficacy is not likely to lay it aside again. Still it is not well to be timid in the choice of the dose; the effect is apt to fail if less than half a grain of the substance, or a corresponding number of minims of the tincture, is exhibited, and the mere teasing effects, as I would call them, are not so injurious in any drug as in this one. I have often obtained much benefit by following the late Dr. Formey's suggestions, and ordering inhalations of sulphuric ether, by holding a cup containing a teaspoonful of the remedy before the mouth. It may be also used in those peculiarly harassing asthmatic attacks which accompany stenosis of the valves, or dilatation of the heart.[2] I possess no observations on the value of chloroform. I have also found irritation of the gastric distribution of the vagus of use, by the exhibition of ipecacuanha in large or small doses. The influence of cold, in the shape of ice pills or artificial ice, often affords instant relief. Marshall Hall gives the greatest praise to hydrocyanic acid, used internally or by inhalation. Percival and Laennec recommend strong coffee. Musk also maintains an ancient reputation. In modern times smoking narcotic leaves made up into a cigar has been recommended; thus I have seen relief, though only of a temporary and palliative character, from employing the datura stramonium in this way. Others recommend the lobelia inflata. The radical treatment is promoted by attending to the etiological indications. The digestive organs, the kidneys, and the anæmic condition of the patient, deserve an especial attention. Tympanitic distension of the abdomen, and especially in the colon, is most effectually treated with enemata of cold water and cold sponging. All asthmatic patients are benefited by promoting diuresis. If, in spite of these remedies, the bronchial spasm continues, we may adopt with benefit a plan already recommended by Floyer, and consisting in the application of cold by sponging the body, and wrapping the body in cold wet sheets, this being followed by friction and the use of the river and sea bath. The abstraction of blood, even as a palliative, should be cautiously and sparingly used.

---

[1] Bergson; loc. cit., p. 68.

[2] See Hope's excellent description, in his Treatise on the Diseases of the Heart and Great Vessels, 3d ed., p. 401.

CHAPTER XII.

INSPIRATORY CONVULSIONS.

SINGULTUS.

Hiccup.

It is more frequent to find spasmodic action affecting the respiratory organs in groups, than limited to single nervous tracts; and this may occur idiopathically, or, as is more commonly the case, secondarily, and in connection with other affections. This variety of respiratory spasm is always accompanied by a more or less sonorous explosion, and forms paroxysms with free intervals.

Convulsio singultuosa consists of attacks of sudden jerking inspirations with a peculiar sound, followed by a short expiration. The præcordial region at the time is rendered prominent by the abdominal viscera being protruded. Deglutition and speaking are interrupted.

The intensity and duration of the spasm vary. The former sometimes rises to such a pitch, that the whole trunk vibrates, and a sound is uttered which may be heard at a distance. It is generally of short duration, being commonly limited to weeks or months; but instances occur of its lasting six months and more. Thus in 1849 two Polish jewesses applied for relief in the Policlinique, which was under my superintendence, one of whom, 17 years of age, attributed her illness to an emetic administered in her 11th year. The hiccup occurred at irregular intervals, but without ceasing for a whole day, nor was it arrested by sleep. In the other, a girl of 21 years, the disease had commenced three years previously after a violent fright, caused at the first outbreak of the Cracow revolution. The hiccup, owing to a complication with spasm of the glottis, was louder and more sonorous than in the first case. A spasmodic throwing back of the head g the attack in the latter, and in the former frequent paroxysms of dyspnœa, with sibilant respiration, during which the hiccup was entirely arrested, showed the participation of other nerves. In both there was tenderness of the epigastrium, and of the spinous processes of the lower cervical and upper dorsal vertebræ, leucorrhœa, with regular menstruation. There was no trichoma. All the remedies previously tried had been ineffectual.

Early and advanced periods of life offer a predisposition. Reflex irritation is the most frequent source of the affection. Older and more recent authors have erroneously assumed the diaphragm and the phrenic nerve to be its main seat. In diaphragmatic pleurisy hiccup is a rare symptom; and it is not produced by irritating the phrenic nerve, as proved by two cases communicated by Bright in the twenty-seventh volume of the Medico-Chirurgical Transactions; the one a case of tetanus, and the other of asthmatic attacks and convulsions of the diaphragm from irritation of the right phrenic nerve by fungous tumours surrounding it; but unaccompanied by hiccup throughout the entire course of the disease. On the other hand we often find that irritation of the internal surface of the pharynx, the stomach, the intestinal canal, and of the liver, are frequent causes of the complaint. Thus we see hiccup accompanying a critical discharge of bile; as it occurs in Asiatic cholera, in which disease I have often noticed that it was a favorable symptom when associated with vomiting of grass-green matters. Pressure on the stomach may also produce it; a patient who was under my care became affected with hiccup whenever I compressed the epigastrium. It not unfrequently results from a premature arrest of dysentery and diarrhœa. In second order after the intestinal canal the uterus is frequently the seat of reflex irritation; and attacks of singultus precede the catamenia, and occur on their suppression. The cause not unfrequently resides in the central nervous organs. Such may be, —injuries of the brain and spinal cord, mental influences, the impression produced from hearing or seeing others affected, though not so frequently as is the case in laughing or yawning, (Sauvages[1] relates an instance,) exhaustion of the central organs by loss of blood, or by discharges, by gangrene, by tedious labours, or a tendency to epilepsy, the hiccup occurring as the precursor or sequel of the paroxysms. In a case communicated by Ollivier,[1] in a man who, from his twelfth year, had been subject to epilepsy, each fit commenced with the sensation of a ball rising to his pharynx, accompanied by violent hiccup, which lasted from one to two minutes. Loss of consciousness and anæsthesia ensued, and two or three minutes later the paroxysm terminated. At the post-mortem examination two encysted tubercles, of the size of a nut, were found in the medulla oblongata.

---

[1] Nosol. Meth., ed. Daniel, vol. iii, p. 183.

In the treatment we have first to attend to the indicatio causalis. I remember a case of singultus which was under the treatment of my late instructor, Professor Berends, which arose from suppressed menstruation, and resisted the various remedies employed during several days, until three ounces of blood were taken from the foot, when it ceased instantly. When it arises from exhausting discharges, especially in individuals of an advanced age, nothing, as Sydenham[2] already observed, is so efficacious as a full dose of opium. If the cause is unknown we must operate upon the central focus, or try to counteract the reflex irritation. The former is done by establishing counter-irritation in the vicinity of the upper cervical vertebra. Horth[3] strongly recommends the application of a blister round the neck, above the origin of the phrenic nerve. The reflex action must be overcome by mental influences; directing the attention to another subject and fright, have long possessed the reputation among the public of being successful means of cure. We may obtain the same effect by derivation to other motor tracts, for instance by an expiratory effort. Hippocrates[4] observes in his aphorisms: "Sneezing coming on in the case of a person afflicted with hiccup removes the hiccup." Cruveilhier communicates two cases of violent singultus, which lasted eleven days in one and fifteen days in another patient, and had exhausted them to the utmost. He ordered them to be held down upon a chair, had the head bent backwards, and poured water in a stream down their throats to the amount of one quart: from time to time, in order to increase the energy of the pharyngeal contractions, he allowed the water to fall upon the nares, which induced cough, threatening suffocation and concussion of all the respiratory muscles. In one the hiccup at once ceased, in the other it returned on the following day, but yielded permanently to a repetition of the process.[1] It has also been recommended to attack the neighbourhood of the diaphragm on the supposition of this muscle playing the main part in hiccup. Dry cupping, frictions with narcotic remedies, the endermic application of morphia, bandages to the thoracic and præcordial parietes, affusion with cold water, have proved efficacious in some obstinate cases. Laennec[2] cured a case of hiccup which had lasted for two days, by advising two magnetic plates to be applied respectively, to the scrobiculus cordis, and to the corresponding point of the vertebral column. Six months after the patient had one day forgotten to apply the plates, and the singultus returned, but ceased on renewed application.

---

[1] Traité des Maladies de la Moëlle Epinière, 3d ed.; Paris, 1837, p. 778.

[2] Sydenham Society's English edition of Sydenham's Works, vol. i, p. 65.

[3] Remarks on Hiccup, its Causes and Cure, in Edinburgh Medical Journal, April, 1833, p. 305.

[4] Sydenham Society's edition, vol. ii, p. 754.

OSCEDO, CHASMUS.

Yawning.

This is a succession of yawns occurring in paroxysms following each other with greater or less rapidity, and accompanied by the well-known phenomena of gaping, flow of saliva, secretion of tears, and hardness of hearing, with dull tinnitus aurium.

This affection, like singultus, must be classed with the inspiratory convulsions; ordinary yawning is an act of inspiration, the expiratory muscles having no part in it, as shown by the observations of fracture of the lower cervical vertebræ. Bell[3] remarks expressly of a patient affected with fracture of the sixth and seventh cervical vertebræ, that he yawned like a man in health, but was unable to execute a strong expiratory movement properly. Besides the combined inspiratory movement in yawning and oscedo, the action of the facial nerve also comes into consideration, the digastric branch of which causes the contraction of the muscle that draws the jaw down and opens the mouth. The facial is also the nerve of facial expression, and as such the most susceptible of all to the stimulus of mental impressions; we thus have an easy explanation of the imitative contagion, and the facile communication of yawning and oscedo from one person to another.

---

[1] Révue Médicale, 1824, vol. ii, p. 83.

[2] Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur, 4th ed.; Paris, 1837, vol. iii, p. 498.

[3] The Nervous System, &c., 3d ed., p. 400, Case CXLIII.

Of the sources of reflex irritation, those which proceed from the hypogastric plexus, and the gastric branches of the vagus, are the most frequent. The uterus bears a close relation to this convulsive affection; it follows that it is much more frequent in the female than in the male sex, and is peculiarly intense in hysteria. Mere repletion of the stomach with undigested food, shows the dependence of the act of yawning upon irritation of the vagus, which also manifests itself in gastric neuralgia, (see p. 104.) The centric origin of the yawning spasm is shown in cerebral disease, especially in apoplectic states. Sometimes it serves to announce universal convulsions, as in parturition[1] and violent hæmorrhages.

In therapeutics the same maxims apply that hold in singultus.

---

[1] Roederer de Oscitatione in Enixu; Gœtting. 1759.

CHAPTER XIII.

EXPIRATORY CONVULSIONS.

STERNUTATIO.

The sneezing fit consists of frequent and violent attacks of sneezing, with few intermissions, (ptarmus, sternutatio convulsiva;) it is one of the rarer convulsions, and is dependent upon the nerves of the expiratory muscular apparatus, for the old view of the predominant action of the diaphragm in sneezing is unfounded. The diaphragm is a muscle of inspiration, and is only engaged in the short inspiratory effort that precedes the sneeze; persons who have suffered a fracture of the vertebræ even below the origin of the phrenic nerve, are consequently unable to sneeze and to blow their nose, as in both it is necessary to expel the air through the choanæ.

Ordinary sneezing is a reflex act excited by irritation of the nasal filaments of the fifth pair; when its second branch is affected with anæsthesia, neither tickling the nasal cavity nor the proximity of pungent odours produces any effect. Other filaments of the fifth exert a similar influence. It is probable that in the sneezing produced by the incidence of a bright light upon the eye, the ciliary filaments of the naso-ciliary nerve are more implicated than the optic nerve, for if the latter is pinched or irritated in the living animal no sneezing ensues. De Lens[1] states, that the application of a spirituous liquid to the anterior portion of the palate excites sneezing. I have observed a case of violent sneezing spasm which lasted four years; and in which, after death, the neurilemma of the third branch of the fifth nerve, before its exit from the skull, was found to be morbidly changed, (see p. 255.) Brodie[2] states the case of a woman, aged 37 years, who was attacked once a week with sneezing fits, in which she sneezed at least an hundred times running, and discharged a considerable quantity of watery fluid from the nose; at the same time, she complained of an annoying sense of formication in the face and palate. After a few years the fits became less frequent, and only recurred once a month, but a violent pulsating pain had supervened in the palate, the teeth, and the tongue, without, however, showing any external signs of inflammation or other disease. A young man of 35 years of age, who came under my own notice, had been affected for five years previously without any appreciable cause. Formerly the attacks only occurred every four or five weeks; but for the last six months, scarcely a day had elapsed on which the patient had not sneezed at least fifty times in rapid succession. A creeping sensation in the hard palate almost always preceded, but nothing abnormal was visible here. The attack often commenced if the patient in shaving approached too near the ala nasi. It was commonly accompanied by a copious secretion of tears, and the secretion from the nasal mucous membrane was so much increased, that the patient required two pocket handkerchiefs daily. During sleep there was a perfect intermission. An ocular examination of the parts showed nothing but reddening and excoriation of the lower part of the right nostril, which was fully accounted for by the violent sneezing and the frequent use of the handkerchief. As there was no other indication to be fulfilled, the sesquioxyde of iron was ordered in doses of half a scruple three times a day. In seven days the sneezing had ceased, and the erosion was healed. The carbonate of iron was continued for a few weeks longer, and no relapse occurred. Besides the fifth, there are other foci for the reflex irritation, among which the uterine and intestinal nerves deserve to be mentioned. A lady whom I have been in the habit of attending for some time past, is affected with violent sneezing whenever conception has taken place; it occurs chiefly in the morning hours, and returns in paroxysms during the first months of pregnancy. Brodie was consulted by a young lady of eighteen, who was troubled with attacks of constant sneezing, with a copious discharge of watery fluid from the nose. These alternated with spasmodic cough, or occasionally with globus hystericus and hysterical paroxysms. Her menstruation was irregular and scanty. One of my former hearers informs me, that whenever salacious thoughts suggest themselves to him, he is obliged to sneeze once or more times. Among intestinal disorders, helminthiasis is most frequently accompanied by sneezing; and in a physiological point of view, affords an interesting parallel with the nasal pruritus accompanying worms. We sometimes meet with spasmodic sneezing in company with hooping-cough. Peter Frank had a patient under his care, who sneezed upwards of an hundred times in every paroxysm, and Joseph Frank[1] relates a similar instance. I have observed an instance in a boy of thirteen, in whom the sneezing fit was substituted for the paroxysm of the cough, the attacks of the former occurring in the same order and frequency as those of the latter.

---

[1] Dictionnaire des Sciences Médicales, vol. lii, p. 578.

[2] Lectures illustrative of certain Local Nervous Affections, p. 61.

When the sneezing fit is very intense and of long duration hæmorrhage and convulsions are to be feared; the older authors even speak of its ending fatally. Haller[2] met with a case in which a violent hysterical sneezing fit was followed by an upwards strabismus; and Hildanus[3] with one which produced blindness, which was cured by the application of a seton to the back of the neck. Under such circumstances it becomes a matter of consequence to arrest the attack, and nothing is more adapted to this purpose than emetics. Haller[4] also states that there is a way to stop sneezing by rubbing or pressing the angle of the eye to the nose, by which means we, as it seems, compress the nerve which lies there and passes from the fifth pair to the nostrils.

PERTUSSIS, TUSSIS CONVULSIVA.

It must be manifest to every observer that the expiratory movements predominate in cough; for this reason, the cough becomes very imperfect or is even rendered impossible when the spinal cord has been injured. Thus Bell[5] states of a patient, who was paraplegic in consequence of a fracture of the sixth and seventh cervical vertebra, "when he is asked to cough he pulls up the ribs and expands the chest and lets them fall; he coughs, but not strongly. It is obviously only by his power of raising the chest and giving elasticity to the ribs and by the weight of the parts falling, that he is enabled to expel the breath. He cannot divide the expiration into two coughs, nor give two impulses to the air; but each time he coughs the elevation of the chest must precede it." Mechanical irritation of the vagus in its course through the neck induces cough in animals. Cruveilhier[1] has observed this to be the case in his own experiments; and I have had occasion, at the Berlin Veterinary school, to see that violent coughing was induced in a horse in whom a portion of the right vagus had been removed, whenever the upper end of the nerve was pinched between the fingers; in doing this I carefully avoided touching the larynx. In Astley Cooper's second operation of applying the ligature to the carotid artery, immediately after completing the dressing, as the patient rose from the chair, so violent an attack of cough ensued that a fatal issue was feared; it was probably induced by the irritation of the adjoining vagus by the ligature and the knotty surface of the artery. Between the sixth and twenty-second day on which the patient died, violent paroxysm of cough followed by dyspnœa returned frequently. At the post-mortem examination the outer surface of the aneurismal sac was found inflamed along the course of the vagus to the base of the skull.[2] Gendrin[3] also relates a case in point: a young man, in consequence of an attack of parotitis, suffered from a large abscess, covering the right side of the neck down to the clavicle; this was opened by Dupuytren, by an incision of an inch and a half in length, and discharged a large quantity of pus, leaving the carotid exposed. From that moment the patient was seized with violent attacks of a dry dyspnoic cough, the exposure of the carotid was inseparably connected with that of the vagus, and the cough was attributable to the irritation of the nerve, which ceased as soon as the healing process withdrew the vagus from atmospheric contact.

---

[1] Praxeos Medicæ Universæ Præcepta, vol. ii, p. 831.

[2] Albrecht, in Ephemer. Curios., Nat., Decas II an. 1687, observ. xii.

[3] Elementa Physiol. Corporis Humani, vol. iii, p. 304.

[4] Centur. I, obs. xxiv.

[5] The Nervous System, &c., p. 400, Case CXLIII.

In ordinary coughing a contraction of the rima glottidis takes place accompanied by spasmodic expiratory movements of the thoracic and abdominal muscles; in each expiratory movement the rima opens a little, and a loud sound is produced.[1] In spasmodic cough spasm of the glottis forms a constituent of the affection and has given rise to the vernacular name of the disease—hooping-cough.

---

[1] Dictionn. de Médecine et de Chirurgie Pratiques, vol. xii, p. 44.

[2] Hugh Ley; an Essay on Laryngismus Stridulus, p. 438.

[3] In his Translation of Abercrombie's Work, Des Maladies de l'Encephale et de la Moëlle Epinière, 2d ed., p. 627.

A sense of titillation in the course of the trachea or at the pit of the stomach, which may be looked upon as the aura of the vagus, precedes; there is a feeling of contraction and oppression of the chest, during which the patient generally seizes hold of a firm object; at times there is nausea, and then attacks of cough supervene, the expiration occurring in jerks, and in more or less rapid succession, introduced or interrupted by a sudden inspiration with a lengthened sound. The respiratory muscles act tumultuously, the abdominal muscles are drawn in and rigid, the trunk is bent forwards. At times there are convulsive movements of the extremities and starting of the whole body. Suffocative attacks are the more violent and threatening the less the patient exhales. The impeded transmission of air through the lungs shows itself in the absence of the vesicular murmur,[2] as well as in the phenomena accompanying a disturbed state of the circulation, viz., lividity of the humid face, congestion of the eyes, and ecchymosis between the conjunctiva and sclerotic, hæmorrhage from the nose, the cavity of the mouth, and the bronchi. The cough is dry, or a little viscid mucus is expectorated with difficulty. After a duration of from two to five minutes the paroxysm, which often consists of two fits, divided by an interval, ceases; it generally terminates with vomiting of bronchial mucus, and of the contents of the stomach, and at times with syncopic exhaustion. After this an interval of *bien aise* ensues.

Taking a general view of the disease we find that it presents a stage of development, a period at which it is at its height, and a stage of subsidence. At the commencement the paroxysms are incomplete, there is no spasmodic contraction of the glottis, nor the sonorous inspiration. As the disease progresses the attacks increase in severity, and become more frequent. The subsidence of the affection is marked by the diminished frequency of the fits, and especially by an increased secretion in the bronchi, the peculiar tone and character of the cough often continuing to the end of the disease.

---

[1] Müller's Elements of Physiology, Dr. Baly's translation, vol. i, p. 352.

[2] Laennec; Traité de l'Auscultation Médiate, 4th ed.; Paris, 1837, vol. i, p. 224.

The phenomena of hooping-cough are subject to modification by other morbid processes; the most frequent complication is with catarrh, the complication with inflammation coming next in order. In simple hooping-cough the bronchial mucous membrane is more or less affected; it is only in very young children that the spasmodic form is seen free from every complication. When complicated with catarrh the mucous membrane becomes more intensely and more generally involved. Reddening of the conjunctiva, suffusion of tears, nasal catarrh, with an oppressive pain in the vicinity of the frontal cavities, frequent sneezing, and the discharge of a thin, acrid, serous fluid from the nose, febricitation, scanty urine, accompanied by ischuria; heat alternating with horripilations, show themselves from the commencement and from the introductory symptoms. The cough does not, as yet, present the suffocative character, but it differs from a mere catarrhal cough in occurring at considerable intervals and lasting a long time. The first stage lasts from seven to fourteen days, and according to Lombard's observations, instituted during an epidemic at Geneva, even as much as four and six weeks; the paroxysms then become fully developed. The mucous secretion becomes more copious; the expectoration thicker, purulent, and of a yellowish colour. During the intervals distinct mucous râles may be heard on auscultating different parts of the thorax. The other symptoms of the catarrh cease; after a time the sputa are simply mucous, while the paroxysms of the hooping-cough continue with the same intensity.

When there is an inflammatory complication, whether with bronchitis or pneumonia, during the course of the disease (for sometimes they form its starting point), the free intervals may disappear; a new series of symptoms then arises, viz., permanent acceleration of breathing, dyspnœa, the characteristic symptoms presented by percussion and auscultation, a livid hue of the lips and cheeks, fever, incapacity for exercise and exertion, loss of strength and of the reproductive powers. A change is often perceptible in the fit of coughing when the inflammation is at its height; the spasm of the glottis occurs but rarely, although the expiratory efforts are violent and follow each other in rapid succession. As the inflammation abates, the sonorous cough returns. In this respect the phlogistic process differs from tubercle; for I have found that even the formation of large cavities presents no arresting influence to the continuance of the croup until death, even after lasting three months and more. The exanthematic process does not exclude pertussis, though Storch[1] has observed it to be arrested during smallpox, and Wall[2] has noticed the same during measles and scarlet fever. In the epidemic of intermittent fever that occurred at Milan in the year 1815, hooping-cough was observed to cease during the ague fits.

Our knowledge of the morbid anatomy of this disease is inconclusive, as we rarely have an opportunity of post-mortem investigation in simple hooping-cough. Antenrieth's[3] observation of inflammation of the vagus, in its course through the thorax, has not been confirmed by others.[4] For a considerable time past, I have directed my attention to the subject of irritation of the vagus in pertussis, by an inflammatory process occurring in the adjoining bronchial glands, and in several cases the cadaveric inspection has confirmed my views. An opportunity but rarely presents itself, of making the examination in the early stages of the disease; but, even during the later periods, I have met with some glands among the hypertrophied and tubercular bronchial glands, of the size of a pea or small bean, with a dark red and congested appearance, from which, on incision, a drop of blood was discharged. In the same way as the energies of the vagus are weakened by compression, they may be stimulated by irritation of neighbouring tissues; and the recurrent nerve which is given off in those parts, is particularly likely to show its participation in the irritation, by a spasmodic affection of the glottis. The rapid formation of dilatation of the bronchi,[5] hypertrophy and tuberculosis of the bronchial glands, which has often fallen under my own observation, collapse and carnification of individual portions of the lungs, of larger or less extent, as first pointed out by Jörg, twenty years ago, frequently occur as secondary changes.[1] The period of childhood, especially from the first to the seventh year, possesses a most undoubted predisposition to hooping-cough; among 159 cases, quoted by Rilliet and Barthez,[2] 132 occurred at this age, and 27 between the ages of 8 and 14. West states, that more than half the number of cases occurs before the end of the third year, after the fifth the frequency diminishes rapidly; and after the tenth, the disease is so rare, that out of 813 cases, only seven were found of a later period of life. Children under six months are rarely attacked. Girls appear to be more frequently affected than boys; West calculates that, while 55·4 per cent. of his cases were girls, 44·6 per cent. were boys; whereas, in the grand total of sick children under his care, the proportion of girls to boys was as 49·1 to 50·9. Among adults, the female sex is more frequently attacked than the male. The disease is often epidemic, but it is by no means so rare to find it occurring sporadically, as some have asserted. Autumn and spring, rapid changes of temperature, and hygrometric conditions of the atmosphere, favour these epidemics, which resemble each other in having a catarrhal basis, but receive a different character from the permanent genius of the locality. Epidemics of measles not unfrequently precede or follow them. In some countries, as Scotland, Sweden, Denmark, the epidemic influences are supposed to prevail. Most writers assume a communication by contagion; a view that is supported by the observations of hooping-cough being communicated by children to nurses or mothers, or of its being transported by affected individuals to districts which had previously been exempt, or of the successive occurrences of the disease in members of the same family, as well as of the fact of the liability to the disease being destroyed by a previous attack. The expired air is stated to be the bearer of the poison, therefore it is advised to avoid the vicinity and contact, and especially kissing sick children. But in these matters much is mere hypothesis, and we are as yet without satisfactory scientific proofs. Swallowing solids and liquids, laughing, crying, vexation, alarm, bodily fatigue, and as I have often had opportunities of observing, the power of irritation, serve as occasional exciting causes. If there are several children suffering from hooping-cough in a room, and one begins to cough, the others will probably soon follow. Meltzer asserts, that this happens even when the children are separated from each other in different rooms, so that the cough could only be heard.

---

[1] Abhandlung von den Kinderkrankheiten, vol. ii, p. 362.

[2] Treatise on the History, Nature, and Treatment of Chin-Cough; Glasgow, 1813, p. 73.

[3] Tübinger Blätter für Natur und Arzneikunde, vol. i, No. 1.

[4] See Krukenberg's Jahrbücher der Ambulatorischen Klinik in Halle, 1820; and West, Lectures on the Diseases of Infancy and Childhood; London, 1848, p. 277.

[5] See Stokes; a Treatise on the Diagnosis and Treatment of Diseases of the Chest, Part I, p. 155.

---

[1] See Alderson, on the Pathology of Hooping-cough, in Medico-Chirurg. Trans., vol. xvi, pp. 78—93, where there is an accurate account of the post-mortem results, though it is misinterpreted as an adhesive inflammation of the pulmonary cells.

[2] Traité Clinique et Pratique des Maladies des Enfants, vol. ii, p. 230.

The simple disease runs a sluggish course; it may continue for from two to four or six months. During the night, the attacks occur more frequently and violently than by day. Several authors speak of the disease presenting an uniform periodicity and a tertian type, (Rosenstein, Armstrong.) Even the single paroxysms at times occur at stated hours.[1]

The danger is much increased by the supervention of other morbid conditions, for the attack itself only proves fatal exceptionally. Bronchitis and pneumonia very frequently complicate pertussis at the commencement, or during its progress; this may depend either upon the prevailing character of the epidemic, or upon injurious accidental influences. Now that we have the aid of percussion and auscultation, we are enabled to recognise the complications at once, and we no longer run the risk of assuming the presence of inflammatory complications, where they do not exist, as Watts and Marcus[2] have done in their endeavours to demonstrate the identity of pertussis and bronchitis. Tuberculosis is often developed, and passes rapidly through its various stages. Next in order to the lungs, we find the brain and the medulla oblongata most liable to become implicated. Venous congestion, hydrocephalus, less frequently scrophulous meningitis, and convulsions, increase the danger to the utmost; when the former occur, the hooping-cough generally recedes. Occasionally, gastroenteric catarrh, with exhausting diarrhœa, supervenes. Paralysis of the pectoral muscles, and in consequence scoliosis, must be considered as a secondary condition resulting occasionally from pertussis. If this form of paralysis affects both sides of the thorax, the latter assumes the shape known as the pigeon-breast; and this may have induced the erroneous assertion, that hooping-cough may lead to rickets. If its occurrence happens to coincide with the period of dentition, weaning, the stage of convalescence from other and especially exanthematous diseases, or chronic diarrhœa, the prognosis becomes more unfavorable. I have observed relapses in several cases after the disease had apparently ceased for some weeks. West has met with cases, in which the hooping-cough, which commenced in spring, made a pause during the summer and reappeared in autumn.

---

[1] Joseph Frank; Prax. Med. Univ. Præt., vol. ii, p. 831.

[2] Der Keichhusten, über seine Erkenntniss, Natur und Behandlung; Bamberg, 1816.

In regard to the *treatment* of hooping-cough, we may boast of an advance, in having learnt to appreciate the therapeutic demands of the complications. It is unnecessary to advert here to the treatment to be pursued against pneumonia and bronchitis; we have only to remark that the presence of hooping cough should form no counter-indication to the administration of antiphlogistic remedies, and especially of the abstraction of blood; the sooner and more effectually they are exhibited, the more speedily the spasmodic character of the attacks, and the integrity of the free intervals will be marked; these phenomena alone are sufficient to disprove the identity of this disease and bronchial inflammation. Nor have the complications alone met with more attention, but it has been also bestowed upon the primitive character of the prevailing epidemic; this not only affords a practical boon to the present generation, but also seems to assist in the critical interpretation of the past. By such means only can we understand the praise bestowed upon Sydenham and Huxham upon venesection, or Stoll's laudation of evacuants. On the other hand, no progress has been made in the treatment of simple pertussis, and crude empiricism has considerably increased the number of remedies recommended. We know of no method by which we can arrest the progress of the disease, or shorten its duration. In vain have physicians tried to act upon the various organic apparatus; we have not even had the negative advantage of finding that certain methods of treatment increase the symptoms. If Marcus advises a strict adherence to the antiphlogistic method, and Lombard[1] promises a cure by the bold exhibition of the carbonate of iron, in from eighteen to thirty-six grains in twenty-four hours, nobody is likely to doubt the tolerance of the human body of medical interference; and we shall be excused from enumerating the various remedies which the manuals and encyclopædias accumulate for the benefit of the tyro.

---

[1] Bibliothèque Univers. de Genève, 1838, p. 119.

Remedial agents of a different kind have been resorted to in old times. Thus Thomas Willis, the first to introduce the term tussis convulsiva puerorum for this disease, states, that in his time it was customary to employ fright for the purposes of cure. "Hence," he says, "as drugs are of little avail, it is a common practice among the vulgar to place the patient in a corn-binn in a mill, and let the water-wheel revolve to frighten him with its great noise and an ugly appearance, and this occasionally induces a cure."[1] A change of soil and atmosphere is advised by some writers, though I have not been able to convince myself of the advantages it offers.

RISUS CONVULSIVUS.

The spasmodic laugh depends upon an affection of the spinal nerves which control the expiratory movements; ordinary laughing is also connected with expiration. The diaphragm, to which even Haller[2] ascribes an important part in laughing, takes no part in this function, as it is a muscle of inspiration.

The sound of the laugh varies much in health, and according to the sex and age of an individual; Hamberger[3] states that all men in laughing sound ah and o, females ee and a; in the spasmodic laugh the sound is very loud, while the expression of the features, which depends upon the facial nerve, remains cold. The tone of the mind corresponds to the expression, and contrasts with that accompanying ordinary laughing, by being serious and depressed.

It most frequently originates in reflex irritation. Tickling certain parts of the skin, as the sole of the foot, or armpits, easily excites the spasm. Its predominance among the female sex, and in hysterical constitutions, is an evidence of its relation to the uterine system. Zwinger[1] communicates a singular case, in which it preceded miliaria, and ceased on the appearance of the eruption. It is occasionally met with in attacks of mania.

---

[1] De Medicamentorum Operationibus in Corpore Humano; Op. Omn. ed. Genev. vol. iii, p. 63.

[2] Element. Physiol. Corp. Hum., vol. iii, p. 305.

[3] Haller; loc. cit.

A curious observation, and one marked by its great accuracy, in which uncontrollable laughter formed a prominent and permanent feature, has been published by Ulrich in Coblentz, in the 'Medicinische Zeitung des Vereins für Heilkunde in Preussen,' (1835, No. 12.) The following is an abbreviated account of the case:

A young man of 24 years of age had, up to his seventeenth year, often suffered from erysipelas of the face, which had repeatedly been interrupted in its course, and since the last attack of which, his spirits had become materially impaired. About the middle of the year 1830, a slight squint of the left eye, with which he had been affected from childhood, became much more marked; his speech lost its sound, his gait became stiff, he tumbled over his own feet, and, seen at a distance, he appeared to be hopping, as if an effort were necessary to lift his feet. At this time he kept a horse; when he dismounted after a ride, he was often so giddy that he was obliged to catch at support. In January, 1831, the symptoms suddenly became worse, after the patient had been exposed to the influence of great cold in a journey. He had the greatest difficulty in moving his legs, spoke very hastily and unintelligibly, and often laughed unintentionally, which he had never done before. This laughing, which occurred especially during conversation, but sometimes also attacked him in the streets, did not leave him again, and formed the characteristic feature of the disease. The strabismus increased very much from this time, the patient consequently often saw double, and had great difficulty in estimating the distances of objects near him. His hands also lost their strength, and did not grasp so firmly, nor hold what he had taken hold of. The paralysis of the legs increased during the year 1831, and contact with the large toes, or stepping, often caused an unpleasant cramp in the extensor muscles. In February, 1832, a tertian ague seized him, during which all the paralytic symptoms became more prominent. After the ague had subsided, the patient was no longer able to leave the room, and could only walk a few steps while assisting himself with his hands. Deglutition and expectoration became more difficult, and the involuntary laughing increased. Sleep and appetite continued satisfactory, the memory tenacious, and the mental powers were rather increased than diminished: the same was the case with the senses; the sense of touch was remarkably fine throughout the entire cutaneous covering, consequently the patient was extremely sensitive to contact. The acuteness of the senses and of touch continued until death. At times there was headache, and more particularly on the left side of the occiput; this was also accompanied by tinnitus of the left ear. One day in May, 1832, after his siesta, a fever paroxysm seized him, with violent retching and vomiting, complete paralysis of the limbs, and a retraction of the head backwards, which was excessively annoying to the patient, so that he indicated by signs that he wished his head held forwards. Consciousness continued unimpaired. This paroxysm also yielded to appropriate remedies, though it evidently indicated an exacerbation of the disease, for, from this time, universal spasms supervened, in which the patient stretched his limbs, and bent his head backwards. These spasms were the most violent in the morning on rising. Towards the end of summer he was no longer able to move his feet, the hands refused their services altogether, and the patient had to be fed. His speech became more unintelligible, deglutition more difficult, the involuntary laugh increased very much, and broke out whenever a movement was arrested; the spasms of the limbs became more frequent. The patient all the time remained calm and joyful, enjoyed society, and liked to occupy himself with objects of art.

---

[1] Acta Helvetica, 1750.

On the 25th of October another fever paroxysm occurred, and soon after there was complete paralysis of all the voluntary muscles. The muscles of the eyes continued to preserve their independence the longest. The patient in his utter speechlessness could only make himself understood by having the letters of the alphabet repeated, and winking as the letters were pronounced that composed the word required. The lower jaw hung down; the lips could not be closed; and it was with the greatest trouble that any beverages could be administered to him. Consciousness continued unimpaired up to a few hours before death, which took place on the 28th of October.

Ulrich assumed from the above symptoms that the seat of disease lay in the medulla oblongata, and especially in the anterior strands of the cord.

An oblong projection, of the size of a French bean, was noticed at the lower surface of the right half of the medulla oblongata; a little higher up a similarly coloured, though much smaller, tumefaction was observed. These two brownish eminences, which differed in a marked manner from the rest of the healthy medulla, extended as far as the posterior side of the pons Varolii, which was also in part morbidly affected. The degeneration of the pons Varolii was most marked on the left side, extended forward about half way through the pons, and formed a perceptible elevation; on the right side the degeneration did not extend beyond four lines from the posterior margin.

The bean-sized projection on the right side of the medulla oblongata was invested by the arachnoid, which was easily detached from it. The subjacent brown mass was of a gelatinous consistency, and passed, below and laterally, gradually into the healthy tissue of the spinal cord, without a definite boundary. In the middle fissure of the medulla oblongata a more healthy, less altered, though still somewhat discoloured, portion of medullary tissue was found intervening between the two projections. On a more minute examination of these eminences, they proved to be the degenerated pyramids and olivary bodies. On cutting into the morbid tissue, the degeneration of the pyramids was traceable to five or six lines below the surface; on the right side, however, it penetrated deeper than on the left, and deeper in the pyramids than in the olivary bodies. The restiform bodies, excepting a trifling discoloration where they met the olivary bodies, were perfectly normal. The dura mater, where it covered the basilar groove of the occipital bone, presented two strongly reddened spots, which looked as if they had been subjected to pressure, and corresponded to the eminences on the medulla oblongata. The roots of the spinal accessory, the hypoglossus, the vagus, and the glosso-pharyngeal of the right side, were remarkably red, ut not thickened. The roots of the facial, acoustic, and abducens were more coloured on the left side. The aquæduct of Sylvius and the fourth ventricle were much distended, and the calamus scriptorius was double its usual length and breadth. The spinal cord was normal.

The laughing spasm alternates with other respiratory spasms, and especially with fits of crying and screaming. When very intense and of long duration, it has been found to terminate fatally. Of this Haller quotes instances, and a modern case is given by Reydellet.[1]

---

[1] Dict. des Sciences Médic., vol. xlix, p. 38.

sometimes also when an attempt is made to pronounce a single letter. The preceding sound or syllable is repeated in explosive sounds, (b, d, g, k,) until the impediment has yielded. This is not done where the sound is continuous, (f, s, r.) Sometimes the column of air is violently forced through the rima glottidis without producing a sound. Other spasmodic phenomena, in the range of the respiratory, irritative, and articulating movements, associate themselves with temporary aphonia. Expiration is more or less impeded; the inspiratory muscles of the neck and thorax are much agitated; the facial muscles are distorted; the eyelids open and close forcibly; the alæ nasi play; the lips jerk up and down; and the tongue is forced in spasmodic snatches against the upper or lower row of teeth. The clonic spasm sometimes passes into one of a tonic character; the voice is silenced; the mouth closes firmly; the tongue softens; the face becomes crimson; and the veins are swollen. The patient is in a state approaching to suffocation until the spasm is relaxed, and the sounds are again given forth. The convulsive obstacle only occurs in sonorous speech; there is no difficulty in articulating if the individual confines himself to a whisper.

It is this that essentially distinguishes stuttering from *stammering*, which consists in an inaptitude, an impediment to the articulating movements, and with which it is frequently confounded, although Arnott,[1] and after him Schulthess[2] and Müller,[3] have given physiological reasons for assuming closure of the glottis as a condition of stuttering. Stuttering does not, however, always occur as a simple affection, but may be complicated with affections of a spasmodic character, and others; it is met with associated with strabismus and chorea.

The male sex has by far the greater predisposition to stuttering. Colombat[4] asserts, that one person in 2500 stutters, but that only one woman in 20,000 is affected. Childhood and youth peculiarly predispose to it; it is rare before the fourth year, it increases from the seventh to the fifteenth, so that one seventh of the whole number belongs to this period of life. Old age carries with it a spontaneous cure of stuttering; it is frequent to meet with hereditary predisposition; two fifths of the cases mentioned by Colombat asserted that it was a family failing. Intestinal irritation, the development of puberty, exhausting, especially spermatic, discharges, mental emotions, and irritation, have been observed to cause the complaint. The atmosphere exerts an occasional influence upon stuttering, many persons have a presentiment of atmospheric changes, in the greater difficulty of articulating; dryness of the air in summer and winter favours its occurrence. Nothing is more apt to increase it than embarrassment, timidity, expectation, while it is diminished, or ceases as soon as the individual affected is left alone, or in the dark, or puts on a mask. It occasionally remains in abeyance during the course of other diseases. There is an undeniable reflex action upon the mind, for stutterers are irritable and shy.

---

[1] Elements of Physic, or Natural Philosophy.

[2] Das Stammeln und Stottern; Zürich, 1830.

[3] Elements of Physiology, Dr. Baly's translation, vol. ii, p. 1054.

[4] Traité de tous les Vices de la Parole et en particulier du Bégaiement, 3d ed., 1840, p. 263.

In the *treatment*, too little regard has of late been given to the cause, while undue attention has been paid to the gymnastics of the tongue, the inutility and even risk of medical dilettantism have been fully displayed in this matter.[1] According to the requirements of the individual case, local or general abstraction of blood, or tonic stimulants, the use of cold or of sea-baths, are indicated; no treatment has been followed by more satisfactory results than the exhibition of purgatives; even obstinate cases have yielded to this system, of which a remarkable instance is related by Bostock:[2] whenever in this case the stuttering returned, it was removed by the employment of purgatives combined with a strictly antiphlogistic diet. Greater expectations have been raised by a psychical cure, whether by withdrawing the attention to other subjects, or by fixing the will upon the process of articulation, or by a threat of punishment, than have been realised. Arnott, on the strength of his own views regarding the seat of stuttering, advised that the temporary closure of the glottis should be prevented, by intoning the voice between the individual words, *e.g.* by interposing an e; a suggestion to which he may also have been led by observing that stuttering ceases in singing. Müller is of opinion that the same theory of maintaining the glottis open, may be more appropriately realized by accompanying the articulation by a constant intonation. The reading lessons are not to contain any mute consonants, b, d, g, p, t, k, but merely sentences with vowels and consonants, capable of an accompanying intonation, f, x, sh, s, r, l, m, n, u; they are to be articulated with intonation, and to be drawn out very long. The writings of Colombat and Lichtinger contain other statements and propositions, for which we must refer the reader to their works. The curative influence of rhythm in stammering is of considerable interest; even uniform rhythmic inspiration is useful; it is well known that there is no stammering in singing: we may therefore assume that it is a result of the musical character of their language that the Chinese and Cochin Chinese have no stammerers; in their language, a large number of words possess a different signification, according to the six modulations of the voice with which they are uttered. Colombat had a young man from Cochin China under his care, whose father was a Frenchman, and his mother a native; and who only stammered when he spoke French, while he expressed himself fluently in the language of his country. It is essential for the cure, to speak in time; cases have been observed, in which not only stammering, but also coexisting spasms of the facial muscles and chorea were removed by rhythmic exercise. The surgical treatment introduced by Dieffenbach, of dividing the root of the tongue, and removing a uniform horizontal portion, has been very properly abandoned.

---

[1] See Dr. Lichtinger; über Orthophonie und Orthoepie, oder über Heilung der Stimm- und Sprach-fehler; Berlin, 1840.

[2] History of a Case of Stammering successfully treated bv a long-continued use of Cathartics, in Med.-Chir. Trans., vol. xvi, p. 72.

The spasmodic affection of the vocal nerves is manifested not alone by an interruption, but also by an abnormal pitch of the voice.

Too little attention has hitherto been paid to alterations of the voice in nervous diseases, especially in those of a nervous character. It may be affected in regard to force, to compass, to purity, or timbre, and either permanently so or temporarily. We have the most frequent opportunity of convincing ourselves of this fact in hysteria and epilepsy; it is apparent in ordinary speaking, but is more marked in singing. There are also spasmodic affections of those muscles which serve to stretch the chordæ vocales; and by this means peculiar sounds are produced, that rise and fall in the scale without intervals, as in howling and screaming, or are associated with movements of the lips and even of the tongue, and thus receive a hissing or clacking accompaniment.

Vocal spasms occur chiefly in the female sex, at the period of puberty, during amenorrhœa, in hysterical or epileptic constitutions; the epileptic attack frequently commences with a loud fearful scream. Vocal spasms take place almost exclusively during waking; they make short intermissions, and have a great tendency to relapse, and to associate themselves, or alternate with other respiratory spasms, as spasm of the glottis, sobbing, sneezing, coughing, and eructations.[1]

Five and twenty years ago, in consultation with my late friend, Dr. Heim, I attended a young lady, who while awake uttered sounds which closely resembled the noise of a saw mill, and were so loud that they could be heard on the staircase; they occurred every ten minutes, and were accompanied by very considerable exertion of the respiratory muscles. In speaking, the voice was normal. Bell was consulted on account of a young lady of fifteen, who uttered a convulsive barking noise, in which the larynx alone was affected, and in which the harmonious action of pharynx, the velum palati, and the lips, was wanting. Sometimes she had a natural cough in the intervals of her attacks, but this cough did not prevent the return of the disagreeable harsh sound, which she uttered ten times in the course of a minute; during sleep it ceased, but it recurred instantly upon waking. It persisted for four weeks, and returned in three successive winters.

A peculiar combination of vocal spasm with other nervous affections was presented to me in the person of a medical gentleman, of 60 years of age, from Russia, who, in 1846, applied to me for advice. His health had become impaired since the first cholera epidemic in 1830, during which he had been exposed to much cold and fatigue. The first symptoms were a painful spasm in the muscles of the back of the neck, with a creaking noise in the upper cervical vertebræ. Asthmatic attacks following any emotional affections, after meals, or the use of spirituous liquors, ensued. In August, 1844, while passing a night in a bivouac, he caught a violent cold, and was attacked a few weeks after by a histrionic spasm of both halves of the face, with which he remained affected from that time. Spasm at the entrance of the gullet and of the trachea supervened. During the attack, the patient presented the appearance of a person choking; his forehead was deeply furrowed, the eyelids were firmly closed, the lips pointed like a funnel, and the cheeks were laid in deep folds. When the mouth was inspected, the velum palati was seen drawn down by the spasmodic action of the constrictor isthmi faucium, superior and inferior, and the uvula had almost disappeared, owing to the spasm of the arygos uvulæ. After a long inspiration, a short jerking expiration ensued, accompanied by a loud roar, which could be heard all over the house. The spasm thus remitted for a short time in order to recommence with a fresh inspiration. He was a long time going to sleep, but when he had done so, the spasms ceased, soon to return on waking up. Music exercised an almost magical effect; as soon as he heard it the spasm was allayed, but it ceased directly when he played the violin,—an instrument which, therefore, was always by his side; his face at once, if ever so much distorted by the spasm, assumed a calm, joyful expression, and the pharyngeal spasm vanished. A strong resolution and pleasing impressions shortened the paroxysms, and rendered them less violent. A few whiffs of tobacco, drawing a cord tightly round the neck, and pressure exerted upon the xiphoid process of the sternum, produced a similar effect. After the removal of the hypertrophied tonsils, which my late friend, Professor Dieffenbach, undertook at my request, the attacks ceased for a few days. The convulsive affection was associated with an anæsthesia of the lower extremities, the skin was perfectly insensible to all irritants, and it was only by deep pricks into the muscles that sensation was excited. While the rest of the body was in a state of profuse perspiration, the legs remained cold and dry. The skin of the trunk and of the upper extremities was less sensitive than in the normal state; motility continued unimpaired; the arms and legs were emaciated. The disease had resisted all the remedies of the most varied character hitherto employed.

---

[1] See Gairdner; Appendix to a former Paper on Anomalous Affections of the Respiratory Organs, in Edin. Med. and Surg. Journal, July, 1842, p. 77.

Such cases as the one just detailed excepted, the *prognosis* of vocal spasm is favorable. When we have assured ourselves against mystification and exaggeration, on the part of the patient, for females will even coquet with their spasms, we must expect the most benefit from derivation to the intestinal canal and the skin. Gairdner gives the preference to the application of a blister to the back of the neck. The good effects of cold affusion, of the douche, the moxa, have been frequently observed; the mere threatened application of the last remedy has occasionally produced a favorable change.

END OF VOL. I.

C. AND J. ADLARD, PRINTERS, BARTHOLOMEW CLOSE.

THE

SYDENHAM SOCIETY

INSTITUTED

MDCCCXLIII.

LONDON

MDCCCLIII.

A MANUAL

OF THE

NERVOUS DISEASES OF MAN.

BY

MORITZ HEINRICH ROMBERG, M.D.

PROFESSOR OF MEDICINE AT THE UNIVERSITY OF BERLIN,
ETC. ETC. ETC.

TRANSLATED AND EDITED

BY

EDWARD H. SIEVEKING, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
ASSISTANT-PHYSICIAN TO ST. MARY'S HOSPITAL, &c. &c.

VOLUME II.

LONDON:
PRINTED FOR THE SYDENHAM SOCIETY.
MDCCCLIII.

C. AND J. ADLARD, PRINTERS,
BARTHOLOMEW CLOSE.

CONTENTS.

CLASS II.

NEUROSES OF MOTILITY (*continued*).

PAGE

CHAPTER XV.—Spasm in the Range of the Cardiac Nerves . . 1

" XVI.—Spasm in the Range of the Nerves of the Intestinal Tube . 9

" XVII.—Spasm of the Stomach 16

" XVIII.—Intestinal Spasms 21

" XIX.—Spasm in the Range of the Nerves supplying the Muscles Micturition 27

" XX.—Spasm in the Range of the Nerves supplying the Sexual Muscles 33

" XXI.—Spasms from Excitement of the Spinal Cord . . 42

" XXII.—Spinal Spasms—Chorea 53

" XXIII.—Spasms dependent upon the Spinal Cord as a Central Apparatus—Hysteria 77

" XXIV.—Spasms from increased Reflex Excitability—Tetanus . 100

" XXV.—Spasms from increased Reflex Excitability—Trismus . 117

" XXVI.—Spasms from increased Reflex Excitability—Hydrophobia . 136

" XXVII.—Spasms from Excitement of the Brain . . 153

" XXVIII.—Spasms from Excitement of the Brain—Static Spasms . 156

" XXIX.—Spasms from Excitement of the Brain—Co-ordinated Spasms 167

" XXX.—Spasms from Excitement of the Brain—Psychical Spasms . 178

" XXXI.—Spasms from Excitement of the Brain—Epileptic Conditions 182

" XXXII.—Spasms from Excitement of the Brain—Epilepsy . 197

" XXXIII.—Tremors 230

PAGE
CHAP. XXXIV.—Acineses 237
„ XXXV.—Paralysis of the Facial Nerve . . . 267
„ XXXVI.—Paralysis of the Lesser Division of the Fifth Nerve . 287
„ XXXVII.—Paralysis of the Oculomotor, Trochlear, and Abducens Nerves 290
„ XXXVIII.—Paralysis of the Hypoglossus Nerve . . . 302
„ XXXIX.—Paralysis occurring in the Range of the Nerves which control the Movements of Respiration and Vocalisation . 312
„ XL.—Paralysis of the Spinal Nerves supplying the Respiratory Muscles of the Trunk 325
„ XLI.—Paralysis of the Vocal Nerves . . . 331
„ XLII.—Paralysis in the Muscular Range of the Sympathetic . 334
„ XLIII.—Paralysis in the Range of the Cardiac Nerves . . 339
„ XLIV.—Paralysis of the Nerves of the Alimentary Canal . 345
„ XLV.—Paralysis in the Range of the Nerves that control Micturition. 349
„ XLVI.—Spinal Paralysis 354
„ XLVII.—Spinal Paralysis—Paralysis Saturnina . . 365
„ XLVIII.—Spinal Paralysis—Reflex Paralysis . . . 376
„ XLIX.—Tabes Dorsalis 395
„ L.—Cerebral Paralyses 402

DISEASES OF THE NERVOUS SYSTEM.

CLASS II.

THE DOCTRINE OF THE NEUROSES OF MOTILITY.

CHAPTER XV.

SPASM IN THE RANGE OF THE CARDIAC NERVES.

Experimental results.—The following are the most important results obtained by the experiments instituted recently to determine the relation between the movements of the heart and its nerves, and their irritation. The frog's heart, when removed from the body, continues its rhythmical movements for some time, not less than five, nor more than twelve, hours, at a temperature of from 12°—14°, (59°—64° F.)[1] The oxygen of the atmosphere, warmth, and blood serve as stimuli of the excised heart. The heart ceases to pulsate in an exhausted receiver; the pulsations of the heart may be alternately arrested and restored by alternately withdrawing and admitting air to the receiver of the air-pump.[2] The pulsations cease in hydrogen, and the heart collapses, while, in the vacuum, it remains distended.[3] Oxygen animates and accelerates the movements of the heart; so that they become universal, and almost permanent; warmth exerts a powerful influence. According to

---

[1] Budge; Sympathischer Nerv mit besonderer Rücksicht auf die Herzbewegung, in Wagner's Handwörterbuch der Physiologie, vol. iii, p. 438.

[2] Tiedemann; Versuche über die Bewegung des Herzens unter dem Recipienten der Luftpumpe, in Müller's Archiv, &c., 1847, p. 490.

[3] J. Schulz; Diss. Inaug. de Motu Cordis Ranæ Temporariæ; Berol., 1850, p. 25.

73

Professor Ernst Heinrich Weber's observations, the auricle of a frog's heart, when removed from its ventricle fifty hours after the heart had been taken from the body, contracted 8⅔ times in a minute; when the vessel in which it lay was warmed with the hand, its action was accelerated to 18½ contractions in the minute.[1] When the temperature was reduced to 0° R. (32° F.), the contraction of the heart diminished more and more.[2] We also owe important and novel results to Professor Eduard Weber's experiments with the rotatory apparatus: 1. The demonstration of a tonic spasm of the heart; if the ventricle or the auricle is put in contact with the conducting wires for a few seconds, the muscular fibres contract gradually and persistently, so that the contracted portions are no longer implicated in the rhythmical movements. In this way the entire ventricle and auricle may be subjected to a spasmodic contraction, causing the movements to be altogether arrested. The heart continues in this condition for some time after the interruption of the current, and it is only after a considerable period, and then very gradually, that the tonic spasm disappears, and the rhythmical movements are restored. Professor Eduard Weber states that the local application of strychnine to the internal surface of the heart acts in a similar manner. To render the experiment successful, it is necessary to empty the heart of its blood, because strychnine causes coagulation of the blood, and is thus prevented from acting as it is precipitated, and because the coagulated blood prevents the contraction of the heart. 2. The manifestation of different effects produced by the electric stimulus, according to the point at which it is applied. If the current is directed to the bulb of the aorta of a frog, the contractions of the entire heart are rendered more forcible and frequent; if, on the other hand, the current be made to play upon the pulsating portion of the vena cava, the entire heart beats once more, and then becomes perfectly still, not in a state of contraction, but of complete relaxation, or else the beats become gradually slower, and then cease entirely. 3. Retardation and arrest of the movements of the heart from electric irritation of certain nerves and portions of the central organs; viz., the medulla oblongata and the corpora quadrigemina. The combined action of both vagi is necessary to exert an arresting influence upon the heart either of the frog or of mammals; irritation of only one vagus, or of the medulla oblongata, after division of either vagus, does not retard the action of the heart. During the arrest the heart becomes flat and relaxed, as it is during the diastole, and fills gradually with blood. Continued galvanising exhausts the vagus, and prevents it from exerting this power of arrest, so that in spite of prolonged galvanising, after a pause of longer or shorter duration, the heart again resumes its beats. This experiment will fail if the vagi are pulled or bruised during the preparation. The arresting influence which the brain exerts upon the heart by means of the vagi, accounts for the retardation of the pulse, which accompanies cerebral affections, and especially violent concussion of the brain; the physiological cause of which phenomenon we have hitherto been ignorant of.[1]

---

[1] Eduard Weber; Ueber Muskelbewegung, in Wagner's Handwörterbuch, vol. iii, p. 35.

[2] Budge; loc. cit., p. 443.

In the first edition of this work (pp. 378-9) certain experiments were alluded to, by which it was attempted to show that irritation of the peripheral nerves, and the central organs, is capable of exciting and accelerating the contractions of the heart; we are not in a position at present to lay much stress upon these experiments, because the results they yielded were themselves too vague, and because other observers, such as E. Weber, have never succeeded in influencing the energies of the heart by isolated irritation of the sympathetic nerves, and because, without the application of any stimulus, the heart of recently-killed animals, in the majority of instances, moves irregularly, and even after a lengthened pause, resumes its movements without any external cause.

The recent experiments of Volkmann, which demonstrate the influence of injuries of definite portions of the heart upon the type of its movements, and upon the harmony of the succession and the frequency of the contractions, are full of interest. The excised frog's heart continues to pulsate for a considerable time, as if it had suffered no injury. The type may be at once changed, if the auricle be separated from the ventricle by a rapid stroke of the knife. Both parts generally continue to pulsate actively, but scarcely ever is there any correspondence between the frequency of the beats. If an incision be made vertically down to the middle of the separated ventricle, a complete contraction of the entire muscular mass is seen, but the portion lying to the left of the incision pulsates rather sooner than the other. When the incision is prolonged through three fourths of the length of the heart, the portion to the right follows the contraction of the other half at a still longer interval. When the division is carried down still further, several contractions occur on the left side before the right participates in them; the right side commences pulsating later, but with a different rhythm. After the two halves have been entirely separated, the left pulsates much more rapidly than the right.[1]

---

[1] Eduard Weber; loc. cit., pp. 42—47.

In the spasmodic affections of the heart, which are generally known by the term of palpitation, we find increased acceleration and unrhythmical contractions occurring in paroxysms of which the patients are sensible. The impulse of the heart is sudden and abrupt, though rarely so forcible as to raise the hand or the ear when applied to the thorax. A bellows-murmur occasionally accompanies or masks the heart's sounds. The arterial pulse is generally small and oppressed. There is frequent dyspnœa; the paroxysm ceases suddenly or by degrees, and a free interval commences, during which the heart's action does not deviate from its normal condition.

Sometimes it is only the rhythm of the movements which is disturbed by the cramp. The patient experiences a rolling, or as it were a rising sensation in the heart, followed by an immediate arrest; it is manifested by the intermission of the cardiac and arterial pulse, upon which several unequal and irregular beats occur. It is inseparably associated with a feeling of anxiety. In other cases the contractions of the heart follow each other with abnormal frequency, without any deviation of the individual elements of the cardiac movements from their normal succession. The force of the muscular contraction may at the same time be either increased or diminished. In the latter case there is a continuous series of quick, frequent, weak, and fluttering beats, which correspond to a tremulous, shaking movement in the region of the heart. Finally, in some attacks, the force, frequency, and rhythm are disturbed at the same time; the patient is overpowered by a sense of anxiety, and thinks himself dying; and the oppressive feeling amounts to orthopnœa.

---

[1] Volkmann; Nachweisung der Nervencentra von welchen die Bewegung der Lymphgefassherren ausgeht, in Müller's Archiv, &c., 1844, p. 427.

[A short notice of Volkmann's views is contained in an Analysis of his Dynamics of the Circulation, by the Editor, in the Brit. and For. Med.-Chir. Review, vol. viii, p. 98.]—Ed.

The duration of the paroxysms varies from a few seconds to half an hour, an hour, or more. They return frequently at regular or irregular intervals, or intermit for weeks and months.

A predisposition to the affection exists in youth and the middle periods of life; arthritis, especially if in a dormant state, and a hæmorrhoidal constitution, though less frequently than the former, predispose to it. A deficient and abnormal condition of the blood, the specific stimulus of the peripheral terminations of the sensory nerves of the heart, more frequently predisposes to spasms than the opposite condition. Hope's researches have not only determined the relations of anæmia to spasm of the heart, but have also fixed the diagnosis of this particular form. The impulse of the heart in these cases is abrupt and jerking; a general pulsation of the arteries occurs frequently, for which reason this variety of palpitation is more perceptible to the patient than any other. Auscultation shows the presence of a soft, gentle, bellows-murmur at the orifice of the aorta, accompanying the first sound of the heart. A bruit, or one rather of a humming character, may be heard in the larger venous and arterial trunks. The pulse is frequent and jerking, such as we also find it after considerable hæmorrhage.[1] Reflex influences often induce the affection, though attempts to accelerate the pulsations of the heart in frogs, by irritation of the skin and other organs, prove unsuccessful.[2] They proceed most frequently from the organs of digestion and the uterus; thus, hepatic and stomach affections, especially bilious accumulation and retention, and dyspepsia, act as exciting causes. Spasm of the heart is often induced by derangement of the catamenia, either in their development or after their regular establishment, especially when complicated with anæmia, as we see in chlorosis. In the male sex we also find that irritation of the genital organs, especially if accompanied by discharges, is apt to induce palpitation; it is often the consequence of masturbation. Centric causes are frequent. It is well known how often mental emotions, and particularly ungratified yearnings, whether of love or home sickness, (nostalgia,) induce palpitation; in describing psychical hyperæsthesia, I have dwelt upon the influence of the mind in promoting the affection. The hypochondriasis of students frequently produces palpitation; and an instance of its occurrence from the same cause, in advanced life, is presented to us in Peter Frank[1] himself, who while devoting especial attention to the subject of heart diseases in Pavia, while preparing his lectures, was attacked with such severe palpitations, accompanied by an intermittent pulse, that he felt assured that he was affected with an aneurism; the symptoms only ceased after the completion of his labours, and after he had enjoyed the relaxation and diversion of a journey.

---

[1] Hope; A Treatise on Diseases of the Heart and the Great Vessels, 3d ed.; London, 1839, p. 509.

[2] Budge, loc. cit., p. 429.

The diagnosis of spasm of the heart from other conditions, which are associated with irregular movements of the organs, has been rendered much more certain and accurate by the introduction of auscultation and percussion than it used to be. The criteria that have been hitherto considered indicative of spasm, are—the free intervals; the relation borne by the attacks to exercise and rest (whilst palpitations accompanying organic diseases of the heart are increased by exercise, it diminishes those originating in spasm, which is rather likely to commence during rest, and especially after eating and in going to sleep); the combination with disturbances of other nervous functions; the relief obtained on improvement of the digestive organs. These indications, however, except the integrity of the heart during the interval, are unsafe; we obtain more satisfactory evidence from the normal extent of the heart, as shown by percussion, from the cessation of the bellows-murmur when the circulation is calmed, from the coexistence of a similar murmur in the large arteries, from its being limited to the aortic orifice, and from the absence of harsh, loud, morbid sounds at this and other parts of the heart. In a prognostic point of view we must not overlook the possibility of cardiac spasm after a long duration, passing into hypertrophy of the muscular tissue; it is a result that we find occurring in other muscles when similarly affected.

---

[1] Jos. Frank; Prax. Medic. Univers. Præc., vol. ii, p. 373.

A spontaneous cure is effected most frequently by the appearance of an attack of arthritis; the technical cure is obtained by careful attention to the causes. Thus iron may be said to have a specific effect when the complaint is based upon anæmia; and as the colour of the cheek returns, we find the murmurs of the heart and arteries disappearing. The cure is promoted by nutritious diet, by a sojourn in the country, by exercise without fatigue. If there is plethora we must adopt an opposite line of procedure; blood may be taken by venesection, the vegetable acids, cremor tartari, &c., administered; the diet must be selected accordingly; and we must particularly attend to this point in individuals who, having been accustomed to a stimulating and nutritious dietary with an active mode of life, continue the former after they have abandoned the latter. When we have to deal with an arthritic, hæmorrhoidal, or dyspeptic constitution, we must adapt our treatment to the requirements of the case. With reference to the latter it is to be observed, that it probably will be found to have an atonic origin, and will therefore be aggravated by resolvents, while the preparations of iron and aloëtics, (especially in the form of Stahl's aperient pills,[1]) will benefit the affection. In all these cases we must attend to the regulation of the bowels; the bodily treatment must be assisted by mental regimen. As palliative remedies we may occasionally find digitalis, hydrocyanic acid, colchium, and the mineral acids useful. Some writers have also spoken of arterial pulsations, which they affirm to be heterochronic with the beat of the heart. Thus Albers[2] quotes a few cases of melæna, in which violent pulsation of the abdominal aorta was not isochronous with the radial and cardiac pulse; and Morgagni[3] relates an instance of tumultuous pulsation in the epigastric region which occurred with unequal force and at irregular intervals, being occasionally reduplicated, while the radial pulse was normal. But there was at the same time a large hard tumour which rose and fell, and the day after had again disappeared with the palpitation, after a vein had been opened. The same cause to which so often the isochronous pulsations in the abdomen are due, flatulent distension of the stomach, the duodenum and transverse colon, may, if the pressure be increased, temporarily compress the artery, and thus give rise to the want of harmony in the pulses. The physiological law that, with the exception of the heart and the commencement of the venæ cavæ, and pulmonary veins, no part of the vascular system is capable of spontaneous movements by muscular contraction, is too firmly established, that we should admit a spasm of the arteries upon the strength of a few pathological observations which are themselves not even properly supported.

---

[1] [The following is the formula for Stahl's Pills:

℞. Ferri Pulverati, ℈ss;
Pulv. Aloës, ℈ij;
Ext. Colocynth., ℈j;
Mucil. Gum. Min., q. s.
Ut fiant pil. xl.]—Ed.

[2] Ueber Pulsationen im Unterleibe; Bremen, 1803, pp. 44—47.

[3] De Sedibus et Causis Morborum, Epist. xxxix, art. 18.

CHAPTER XVI.

SPASM IN THE RANGE OF THE NERVES OF THE INTESTINAL TUBE.

Experimental results.—The latest experiments instituted in recently killed animals which yet retain their irritability, have afforded more satisfactory results, with regard to the intestinal canal, as they have in reference to the heart, than those formerly made upon living animals. By avoiding the irritant influence of the atmospheric air, and by employing the rotatory apparatus, we have also succeeded in obtaining definite effects upon the irritated nerves of the intestinal muscular fibres. The experiments have demonstrated that the commencement and termination of the moveable cylinder are under the control of spinal, and the intervening portions of the vagus and sympathetic nerves. If we wish to ascertain what nerves are destined for the movements of individual muscular groups, it is necessary to make our experiments upon their points of origin, as the nerve in its further course becomes mixed up with heterogeneous elements. Thus, the experiments of Volkmann have demonstrated that the contractions of the upper part of the pharynx depend upon the vagus. As each root was divided, a movement was perceptible, either in the soft palate, which occasionally rose, or sometimes was drawn forward, or in the pharynx, the upper part of which was at one time raised, at another contracted. Mayo and Müller were the first to observe that the glosso-pharyngeus exerted an influence on the muscles of the pharynx. Volkmann[1] states that it is only when the smaller root of this nerve, which was formerly overlooked, is irritated, that vivid contraction of the middle constrictor of the pharynx and of the stylo-pharyngeus ensue, whilst the larger root possesses no such influence. The movement of the œsophagus depends upon the vagus. If the roots of this nerve are irritated, powerful contractions ensue in its vertical and horizontal diameter, down to the cardia. The vagus is also proved, by the experiments of Eduard Weber,[1] to exert a decided influence upon the stomach, which was formerly disputed by Müller and others. On applying the conducting wires to the vagi of a dog, the stomach of the animal began to move energetically, as it never does upon mere atmospheric impression, without a direct irritation of the coats. Müller[2] was the first to discover that the peristaltic action is increased by irritating the cœliac ganglion. The objection raised that this was owing to an impression derived from the atmospheric air has been met by Weber, who repeated the experiment without opening the peritonæum, and by observing the intestines through it. On irritating the ganglionic plexuses surrounding the aorta by the rotatory apparatus, the small intestine and the colon, which had previously lain perfectly still, immediately on the current commencing to pass, began to move vividly; their action continued for a long time after the current had been interrupted. The same observer finds that the vagus also possesses an influence upon the movements of the intestinal canal: it is shown most manifestly in a fish, the tench (cyprinus tinca), in which the stomach and intestines have well-marked, transversely-striated muscles of animal life. They contract on the application of electric irritation to the vagi, as rapidly and violently in all their parts as the voluntary muscles do when their motor nerves are subjected to similar irritation. Among the central organs it is the medulla oblongata, which, when irritated by the galvanic current of the rotatory apparatus, most decidedly excites the movements of the stomach and intestinal canal.[3] Budge[4] obtained a similar result, though less marked, on applying the irritation to the cerebellum. The cerebrum and spinal cord exert no influence of the kind.

---

[1] In Müller's Archiv, 1840, p. 493.

With exception of the two orifices, the movements of the intestinal tube possess the peristaltic character. There is a gradual progression of the contractions in undulations, that advance with a certain rhythm. The physiological conditions of the abnormal type of an alteration in the succession of contractions, with a retrograde movement of the undulations, have not as yet been determined.

---

[1] Wagner's Handwörterbuch, &c., vol. iii, p. 50.

[2] Elements of Physiol., Dr. Baly's translation, vol. ii, p. 913.

[3] Weber; loc. cit., p. 49.

[4] Wagner's Handwörterbuch, vol. iii, p. 422.

SPASM OF THE PHARYNX AND ŒSOPHAGUS. DYSPHAGIA SPASTICA.

A sudden difficulty or impossibility of swallowing, accompanied by the sensation of a foreign body lying wedged in the pharynx, seizes the individual; and the symptom ceases as suddenly, commonly with a discharge of air that was retained. Dyspnœa, anxiety, and suffocative attacks are the usual concomitants. The muscles of the neck, the sterno-cleido-mastoid, and the trapezius are sometimes rigidly contracted. The spasm most frequently affects the lower portions of the pharynx or œsophagus. In the latter instance the substance is swallowed without difficulty, but is arrested in the vicinity of the cardia; a constringing pain is felt between the shoulders; there is a copious discharge of mucus and saliva from the mouth, with straining and regurgitation, until the paroxysm passes off, and the patient himself feels the morsel descending into the stomach.

Spasm of the pharynx induces a transitory contraction of the muscular fibres, or leaves a stricture, as an independent chronic affection of the muscular fibres, which has received the name, spasmodic stricture of the œsophagus, but has not hitherto been subjected to investigation by the scalpel and the microscope.

The middle period of life and the female sex are most liable to spasm of the pharynx. Arthritic and impetiginous constitutions afford a predisposition, whilst reflex influences are exerted by neighbouring and distant organs. Ulcerations of the larynx occasionally give rise to the complaint under consideration.[1] It is most frequently excited by irritation, proceeding from the uterus, and accompanies hysteria in the shape of globus hystericus; this term is, however, often applied to a neuralgic affection. Both the spinal cord and the cerebrum may be the seat of centric causes. Spasm of the pharynx occurs very frequently as one of the satellites of tetanus; and diseases of the cervical portion of the spinal cord and its osseous channel, are most frequently manifested by a spasmodic difficulty of deglutition, which with the progress of the disease is converted into a paralytic affection. In hydrophobia spasm of the pharynx is an uniform symptom, and is even excited by the mere mental impression. Friedrich Hoffmann,[1] who was the first to enter into a minute examination of convulsive affections of the œsophagus, relates a case in which the spasms were brought on by a mental impression. The influence exerted by emotions is well known. Epilepsy favours the development of œsophageal spasm.

---

[1] Mayo; Outlines of Human Physiology: London, 1836, p. 280.

The safest means of distinguishing spasmodic from other varieties of dysphagia, and especially from those dependent upon contraction and tumefaction of the œsophagus, is afforded by the introduction of the probang, which should be provided with a large button. Even during the attack it may be passed with a little perseverance, and during the paroxysms the introduction meets with no impediment. We can place less reliance upon the periodic increase and diminution of the symptoms as a diagnostic sign, as organic degeneration, especially while it is being developed, is from time to time accompanied by spasmodic contraction.

The treatment of the affection is frequently very successful if we have regard to the cause. Joseph Frank[2] relates that a patient came to his father, who, in consequence of the suppression of habitual epistaxis, had for nine days been subject to spastic dysphagia. After the application of a few leeches to the nose, the power of deglutition was restored. Sir B. Brodie[3] restored a female, who, for three years, had been subject to dysphagia, so that she could not swallow anything solid, and liquids only with great difficulty, by removing internal hæmorrhoidal tumours, which from time to time had caused considerable hæmorrhage. If we are unable to ascertain or to remove the cause, it is necessary to direct our remedial agents against the peripheral sensory nerves or the central organ. The former indication is best fulfilled by the frequent introduction of a probang: Abercrombie[4] was consulted by a patient, who for more than a year, had been treated for stricture of the œsophagus: instead of the ordinary bougie, he recommended the introduction of an oval ball of silver attached to a wire; this had scarcely been done four or five times before every impediment had vanished. A relapse, which occurred after a year, was successfully treated by the same means. The cervical portion of the spinal cord may be attacked by derivatives and the abstraction of blood, especially by cupping. Among the internal remedies which act upon the central organs, belladonna (the extract dissolved in aqua laurocerasi) deserves the preference. Tode and Wichmann[1] recommend the exhibition of quassia. Patients of this description are always subject to constipation, yet, as Hoffmann correctly remarks, drastic purgatives should be avoided.

---

[1] Opera Omnia, ed. Genevæ, vol. iii, p. 130.

[2] Prax. Med. Univ. Præc., vol. i, p. 144.

[3] Mayo; loc. cit., p. 281.

[4] Pathological and Practical Researches on Diseases of the Stomach, the Intestinal Canal, the Liver, &c.: Edin. 1828, p. 96.

ANTIPERISTALTIC SPASM OF THE ŒSOPHAGUS.

We have but recently learnt to understand the movements of the œsophagus in health. According to the observations of Magendie and Müller, rhythmical contractions of the lower portion of the œsophagus take place independently of the act of swallowing; they last about thirty seconds, and continue longer the fuller the stomach is. The contraction passes gradually into relaxation, which is again followed by contraction, so that the cardiac orifice is not always closed equally.[2] Eduard Weber[3] has discovered that in the œsophagus of the different classes of animals there is a difference in the character of the muscular fibres, and the manner in which they react to the electric stimulus differs accordingly. In rodentia he has invariably found muscular fibres of organic life, which present both longitudinal and transverse striæ; while, in birds, the muscular fibres are non-striated and organic; in the former the movement is entirely that of animal muscles, in the latter, that of organic muscles; in cats and dogs they present a mixed character, the fibre being partly animal and partly organic; the movements accordingly correspond to the double type. Modern research has demonstrated the important part which the œsophagus plays in vomiting. The experiments of Magendie, Legallois, Béclard, and the more recent investigations of Arnold,[1] have proved that the œsophagus performs antiperistaltic movements during vomiting, which even after it has been separated from the stomach are visible when tartar emetic is injected into the veins.

---

[1] Ideen zur Diagnostik, vol. iii, p. 189.

[2] Müller's Elements of Physiol., Dr. Baly's translation, vol. i, p. 503.

[3] Loc. cit., p. 30.

The antiperistaltic spasm of the œsophagus, which takes place without any combined action of the abdominal muscles and the diaphragm, either manifests itself as retching, (*vomituritio, quasi dolores parturientes œsophagi,*) which may exist by itself unaccompanied by any discharge, with the peculiar sense of sickness (nausea), or as an act of regurgitation either of the contents of the œsophagus, as in dysphagia, or of the contents of the stomach, as occurs in eructation and rumination.

RUMINATIO, MERYCISMUS.[2]

After a shorter or longer interval subsequent to a meal, varying from a quarter of an hour to five or six hours, a part of the food rises into the pharynx; fluids do so more easily than solids, vegetable substances more so than animal matters; there is no nausea or retching, no offensive taste, and after the substances have been retained for a time in the mouth they are again swallowed, when another portion rises. This is repeated more or less frequently in a period of time varying from one to six hours. I have compared the cases reported by recent observers, and have not found that there is actual rumination like that of cloven-footed animals; the morsel that is thrown up is not again subjected to trituration by the teeth. The symptom is generally accompanied by derangement of the digestive organs, flatulency, constipation, voraciousness and gluttony, alternating with want of appetite. In the majority of instances it is involuntary; though in a case detailed by Peter Frank,[3] and in another by Blumenbach,[4] the commencement of the act of rumination, and in the latter even its arrest, were dependent upon the will. In some patients it is caused by pressure upon the pit of the stomach or concussions of the body. Eschke[5] relates the case of a deaf and dumb individual in the Berlin asylum, who bolted his food, and after half an hour had elapsed brought it back to the mouth by firmly compressing his stomach with both hands. Dr. Heiling[1] states that a Professor Westendorf, in Güstrow, was able to ruminate whenever he chose, but that he was also compelled to do so if he took any active exercise, for instance, if he rode in a carriage, after a meal. The rumination is said to cease if other diseases supervene. Percy mentions that a patient, who came under his own observation, did not continue to ruminate during a severe attack of gout, although he paid no particular attention to his diet.

---

[1] Das Erbrechen, die Wirkung und Anwendung der Brechmittel; Stuttgart. 1840, p. 84.

[2] [From μηρυκίζω, to ruminate.]—Ed.

[3] De curandis hominum morbis, lib. v, p. 352.

[4] Handbuch der Vergleichenden Anatomie; Göttingen, 1805, p. 137.

[5] Hufeland's Journal des Pract. Heilkunde, 1810, Oct., p. 27.

Neither of the Franks, senior or junior, have met with the affection more than once in their long career. I have myself seen three cases; though it is probable that the symptom is often concealed. All the cases hitherto described, with one exception, occurred in the male sex, and commenced in early life. The causes are unknown; concomitant affections of the digestive organs, have been erroneously assumed to induce it. I am inclined to attribute some etiological influence to the will. Peter Frank is of opinion that in persons who suffer from eructations and are voracious, rumination is induced by a bad habit, the not unpleasant taste of the ruminated matter offering an encouragement to the repetition of the experiment.

In three ruminating individuals, all of the male sex, but whose history has not been further detailed, Arnold[2] has found a considerable dilatation at the entrance of the œsophagus into the stomach, limited above by a constriction, so as to form a genuine cardiac vestibule. The muscular layers of the stomach and œsophagus were strongly developed, and in two cases the stomach and œsophagus were larger and wider than usual. In the first instance the internal branch of the accessory of Willis was much larger than usual, so as almost to equal the external branch, a relation similar to what is found in ruminating animals. Numerous suggestions have been offered with regard to treatment, but they have not produced any beneficial results.

---

[1] Ueber das Wiederkänen beim Menschen; Nürnberg, 1823, p. 13.

[2] Bemerkungen über den Bau des Gehirns und Rückenmarks, p. 211.

CHAPTER XVII.

SPASM OF THE STOMACH.

Of all parts of the intestinal tract, the stomach presents, in health, the lowest amount of movement, even when the abdominal cavity is opened in the living animal, and the irritation of the atmospheric air causes such energetic action in the intestines. The movements become more active under galvanic influence. If the conducting wires of the rotatory apparatus be passed vertically or longitudinally across the stomach, it may be seen distinctly to contract in the direction of these lines. This was most apparent in a dog, in whom the stomach was thus completely divided into separate compartments. After each contact of the wires a gradual constriction ensued. The transverse were invariably deeper than the longitudinal contractions, and the former were most marked in the vicinity of the pylorus.[1] During digestion contractions occur in the pylorus and the pyloric portion of the stomach, as Magendie has described in animals, and Beaumont in man.[2] It has not yet been determined whether the stomach is capable of independent spasmodic action. Budge's[3] investigations, which have thrown much light on the mechanism of vomiting, have shown that the adjoining portion of the intestine, the œsophagus and especially the abdominal muscles, are especially requisite to its production. This alone suffices to prove that vomiting results from the combined action of various nerves, and as it only occurs during expiration, it may be considered to be allied to the expiratory convulsions.

We must here advert to that vomiting which is caused by the irritation of peripheral nervous tracts, by reflex irritation, and by the affections of the central nervous organs. A few observations are on record which render it probable that organic degenerations of the nerves may be the cause of chronic vomiting. Joseph Frank narrates the case of a professor in Wilna, who for a few years suffered from anxiety, nausea, and vomiting during the morning, and was one day carried off by syncope coming on after very violent vomiting. On post-mortem examination, there was found hæmorrhage into the pericardium, a rupture in the left ventricle, and softening of the heart. The vagus of either side, from its entrance into the thorax, was surrounded by steatomatous tumours. A similar growth, of about the size of a hen's egg, occupied the right side of the neck. In a pregnant female, who for three months was subject to uncontrollable vomiting, which occurred thirty times a day, Lobstein[1] found the semilunar ganglia in a highly inflamed condition, which he has represented by a drawing. The stomach was in a healthy condition. Among the sources of reflex irritation, those proceeding from the sensory fibres of the vagus occupy the first rank. A special interest attaches to the auricular branch of the vagus, which when irritated, causes not only cough but vomiting. Pechlin[2] has met with a man in whom violent vomiting was excited by touching his external meatus; and Arnold relates the case of a girl who for a considerable period was affected with cough and expectoration, often vomited, and grew emaciated. On minutely examining her it appeared that there was a bean in each ear, which a considerable time previously she had introduced in play. Their extraction was accompanied by violent coughing, vomiting, and repeated sneezing. The attacks ceased at once, and the child recovered entirely.[3] The instances of vomiting from irritation of the respiratory tract of the vagus are too frequent to render any quotation of cases necessary.

---

[1] Ed. Weber; loc. cit., p. 26.

[2] Müller's Elements of Physiol., Dr. Baly's transl., vol. i, p. 503.

[3] Die Lehre vom Erbrechen; Bonn, 1840.

Next in order we find that the hepatic, the renal, and the uterine nerves, the latter especially during the first months of pregnancy, are the conductors of the reflex stimuli of vomiting. Among the nerves of special sense, the olfactory, gustatory, and optic most frequently convey similar impressions.[4] Mechanical irritation, applied to those parts to which the sensitive fibres of the glosso-pharyngeus are distributed, titillation of the root of the tongue, or the velum palati, excites antiperistaltic movements, retching, and vomiting; whilst contact with the pharynx induces peristaltic movements of the œsophagus. Marshall Hall[1] quotes instances of patients who, in attempting to excite vomiting with the feather of a quill, caused an act of deglutition by approaching too near to the œsophagus, in consequence of which the feather was swallowed. Thus we see that irritation even of tissues in close proximity to one another produces very different phenomena of reflex action. Of the central organs, the spinal cord rarely bears an etiological relation to vomiting. Injuries and diseases of this portion of the nervous system are so uniformly followed by paralysis of the expiratory muscles, that that alone accounts for the rare occurrence of vomiting as a concomitant symptom. Among the great number of observations collected by Ollivier there are but very few instances, and they rather apply to the first stage of myelitis than to other spinal affections. On the other hand, the brain bears a close relation to vomiting. Even the stimulus of a mental impression suffices to excite it; and although instances of voluntary vomiting are rare, (Bichat possessed this faculty, and another instance is quoted by Richerand,[2]) the sight and remembrance of an offensive object give rise to it often enough. Concussions and injuries induce it frequently. Some writers attribute sea-sickness, with all its concomitant symptoms, to a concussion of the brain. This theory, however, is probably too exclusive, inasmuch as it makes no allowance for the influence which the rolling movements of the vessel must have upon the peripheral terminations of the nerves. The mere walking on the moving and gliding surface of the deck, as observed by V. Walther, in his ingenious notes of travel,[3] proves a source of vertigo and vomiting, to one not accustomed to these influences, if the first failing attempts be too long repeated. In the same way we are not justified in attributing the vomiting produced by other circular or rotatory movements of the body to the brain alone. Concussion of the brain is commonly accompanied by vomiting, and every sudden change in the tissue of the organ is liable to produce this effect. Thus Sir B. Brodie[1] observed vomiting to follow at once when depressed portions of the cranium were elevated. The syncope which is analogous to concussion of the brain, also frequently makes its *début* with vomiting. Among the morbid processes occurring in the brain, meningitis and hemicrania are most frequently accompanied by vomiting; but there is no disease of the brain with which it may not be associated, and Abercrombie[2] possesses the merit of having pointed out that there are organic affections of the brain, which at their commencement, and for a considerable period, are veiled by symptoms which indicate the stomach as the seat of disease. The results of the experiments above detailed, demonstrate that the vomiting in these cases, as well as the retardation and irregularity of the contractions of the heart which frequently accompany the former, can only originate in the transmission of the irritation from the brain to the medulla oblongata.

---

[1] Prax. Med. Univ. Præc., vol. ii, p. 292.

[2] De Nervi Sympathici Humani Fabrica, usu et morbis; Paris, 1823, p. 148.

[3] Bemerkungen über den Bau des Gehirns, &c., p. 169.

[4] Observat. Phys. Med., l. ii, obs. 145.

---

[1] Lectures on the Nervous System, &c., p. 23.

[2] Jos. Frank; loc. cit., p. 471.

[3] Journal der Chirurgie und Augenheilkunde von v. Gräfe und v. Walther, 1831, vol. xv, p. 183.

According to my experience the following are the characteristic symptoms which indicate that vomiting arises from a cerebral influence. 1. The influence of the position of the head; the vomiting is arrested in the horizontal, and recurs and is frequently repeated in the erect position. It is also easily induced by movements of the head, by swinging, shaking or stooping, or sudden rising. 2. The prevailing absence of premonitory nausea. 3. The peculiar character of the act of vomiting; the contents of the stomach are ejected without fatigue or retching, as the milk is rejected by babies at the breast. 4. The complication with other phenomena, the more frequent of which are pain in the head, constipation, and the irregularity of the cardiac and radial pulse which is increased during and subsequent to the act of vomiting. The duration of the vomiting is limited in the inflammatory affections of the brain, meningitis, encephalitis, and acute hydrocephalus, to the first stages of the disease; and the prevailing rule is, that as the paralytic and comatose symptoms increase, the vomiting remits and ceases.

---

[1] Pathological and Surgical Observations relating to Injuries of the Brain, in Med. Chir. Trans., vol. xiv, p. 355.

[2] Pathological and Practical Researches on Diseases of the Brain, &c., 3d ed., p. 321.

In a therapeutic point of view, we must not overlook the relief frequently afforded in cerebral affections by vomiting. Surgical notabilities (Dessault, Richter,) upon the strength of this observation have advised the exhibition of tartrate of antimony in concussions and injuries of the brain; and my renowned friend Heim once assured me that, during the long course of his practical career, he had not obtained such satisfactory results in the treatment of apoplectic conditions from any remedy as emetics afforded. There can be no doubt that the fear of their employment in these states has been exaggerated.

CHAPTER XVIII.

INTESTINAL SPASMS.

We may distinguish two varieties of spasms of the intestines—1, one that advances by undulations in a peristaltic or an antiperistaltic direction; 2, the other, in which the affected portion of intestine is constricted in a ring. Both occur separately, or associated with one another, and are accompanied by pain, and various other sensations.

Peristaltic Spasm, Colic.—From whatever part of the intestinal canal the spasm may proceed, it is only the last rapid terminal undulations which are manifested by a frequent desire to evacuate the rectum, and a distressing sense of weight and pressure at the fundament, which ceases after the evacuation, permits of a short rest, and then again returns. The less the discharge the more forcible and more painful the straining, to which a distinct term *tenesmus* has been applied. The strongest proof of the intensity with which, occasionally, the peristaltic spasm of the intestines may take place, is given by the occurrence of prolapsus of all the coats of the rectum; as well as by the analogous condition of intussusception of the intestines, which is only to be distinguished from the former by the circumstances that the inverted intestine is surrounded by a non-inverted portion, instead of being free, as in the latter case.[1] Thus we are able to produce intussusceptions by applying irritants to the intestines. Haller[2] says that he learnt by experiments upon frogs, that it was produced in this manner. If to any point of the intestine a poison is applied, it is constricted, and soon the adjoining portion will be found to ascend, and to surround the constricted portion.

Among the etiological relations of intestinal spasm, those depending upon an abnormal excitement of the motor nerves, are the subject for our present consideration; for those movements which result from irritation of the coats of the intestines in consequence of the altered condition of their contents, the secretions, or their tissues, are but one link in the chains of other morbid processes, which are foreign to our subject; we allude to dysentery, diarrhœa, carcinoma of the colon and rectum. If we first look to the reflex irritation, we find that it occurs frequently, and, if seated in the sacral and lower lumbar nerves, induces not only intestinal, but also vesical and uterine, pains. Vesical calculus, irritation of the neck of the bladder, and of the uterus, act in this manner. Valentin[1] has made the highly-interesting observation, that even irritation of the fifth nerve, at the base of the skull, invariably gives rise to peristaltic movements of the small intestine; and especially of the duodenum and the upper portion of the jejunum. We possess but very few satisfactory pathological facts in evidence of the influence exerted, by the affections of the spinal cord and brain, upon spasms of the intestines. The influence of the emotions, and especially of fright, in increasing the movements of the intestines, is well known; in this symptom, however, the altered state of the secretion is not to be overlooked. The specific action of some medicinal substances upon the contractions of the rectum, is only effected by the agency of the spinal cord.

---

[1] Meckel; Handbuch der Pathol. Anat., vol. ii, p. 325.

[2] Opuscula Pathologica; Lausanne, 1768, p. 66.

Spasmodic Stricture of the Intestine.—Experiments instituted by older writers, and more especially by Haller,[2] proved that irritation of the inner lining of the intestines gave rise to annular contractions, looking as if a thread were tied round the intestine. Henle, very recently, has found that the effect corresponds closely to the amount of irritation applied. If a slight stimulus be used, e. g., gently touching or scratching the external or internal surface of the intestine, or the application of muriatic acid, a trifling annular contraction ensues, which advances to a greater or less distance by peristaltic action. If the irritation is increased, a stricture remains at the part affected, even though peristaltic action ensues in the vicinity. But if the intestine is violently pinched, lacerated, or punctured, a violent contraction, annular or confined to one side, takes place, which may obliterate the passage through the intestines, which does not advance, and continues long after the irritation has ceased.[1] Such constrictions are often found in post-mortem examinations at various parts of the intestine; and may arise after death, and be the effect of the rigor mortis. But there can be no doubt that spasmodic intestinal strictures may occur, and persist for a long time during life, either idiopathically, or associated with other affections. Of the former, Mayo[2] communicates a remarkable instance; it occurred in a medical man who, during twenty years, had only twice, for a brief period, been free from his troubles; once while using warm water enemata, the other time while taking white mustard. During a series of years his excrements were no larger than a horse bean when hard, or, if soft, of the length of his little finger. At times, only an ordinary urethral bougie could be introduced into the rectum, at others the contraction was seated so high up in the rectum that a bougie of three feet in length could scarcely reach it. His sufferings reached the highest pitch; and at last the patient resolved to omit the use of all medicines and bougies, and to persevere in a strict diet, avoiding all irritating articles of food, and to leave the intestines to themselves. At first he, from time to time, came to their aid with water enemata, on account of a troublesome sense of fulness in the intestines and in the head. After two years he was entirely freed from his complaint. Tanquerel des Planches[3] states that the rectum and sphincter ani are in a state of rigid contraction during the violent attacks of painters' colic.

---

[1] De Funct. Nervor. Cerebr., p. 63.

[2] Haller; Opera minora, vol. i, p. 395, Exp. 377-378.

§

Antiperistaltic Spasm of the Intestine—Ileus.—When the abdomen of animals is opened, the movement of the intestines is never merely peristaltic; at some points an antiperistaltic movement is always visible, as Haller has already observed, when he says: "the most complete peristaltic movement is always of a compound character, as neither the gases nor the food are ever seen to advance far without some retrograde movement."[4]

When the stimulus is stronger than that of atmospheric air, the receding undulations of the movement become stronger, and more permanent, and acquire the upper hand. The stomach and œsophagus participate, and the contents of the intestines are evacuated in an abnormal direction. At the same time violent contractions of the abdominal muscles take place, accompanied by phenomena in the sensory sphere, such as are peculiar to the sympathetic; for there is not only pain varying in degree and extent, but also a sense of fainting, and of approaching annihilation, which are manifested equally in the sunken powers, the hollow features, the low temperature, and the small, unequal, quick pulse.

---

[1] Henle; Patholog. Untersuchungen, p. 93.

[2] Outlines of Human Pathology; London, 1836, p. 351.

[3] Traité des Maladies de Plomb.; Paris, 1839, vol. i, p. 209.

[4] Elementa Physiol. Corp. Human., vol. vii, p. 90.

The antiperistaltic spasm is apt to supervene upon any impediment presenting itself to the permeability of the intestine, whether resulting from spasmodic action (stricture, intussusception), or an inflammatory or mechanical difficulty; these circumstances impart distinct features to the individual case, which are fully and minutely detailed in Naumann's 'Handbuch der medicinischen Klinik,'[1] which we would recommend the reader to consult. It has not as yet been determined, either by experiments, or by pathological observations, whether ileus may originate in irritation, or diseases of the central organs of the nervous system.

There are few spasmodic affections in which the therapeutic treatment, that corresponds to our theoretic view of the disease, is so sure of a favorable issue in the uncomplicated cases, as in ileus. Narcotisation of the intestine by opium, either given by itself, or alternated with purgatives, and by tobacco enemata (from 15 to 20 grains for an infusion, with from four to six ounces of water,) are recommended by men of the most extensive experience.[2] The sudden remission of the spasmodic contraction is promoted by the employment of the warm bath and of venesection, which may be repeated as occasion requires, and which in conjunction with local abstraction of blood, anticipates the supervention of inflammation. Upon the same grounds, and in order to limit the tympanitic distension of the portion of intestine seated above the contraction, the local application of cold is advisable. We may also advert to the endermic application of purgatives; I am acquainted with a case, in which ileus had continued for eighteen days, and was removed by strewing six grains of extract of aloes upon a blistered surface on the pit of the stomach.

---

[1] Vol. iv, p. 755—820.

[2] See—Abercrombie; Pathological and Practical Researches on Diseases of the Stomach, &c.; Edinb., 1828, p. 144.

In a like manner as the upper orifice of the intestinal tube, the pharynx, is provided with muscles, the lower orifice is also guarded by a similar apparatus; both being under the control of the spinal system, the consequence is, that those parts do not contract according to the peristaltic type, but rapidly and instantaneously, on the application of a stimulus.

Spasm of the anal muscles.—Hitherto, writers have confined their observations to cramp of the sphincter muscle, although the levator ani, and even the transversi perinæi, may undoubtedly be the seat of convulsive affections. In anal spasm, the individual is seized with a pain confined to the orifice of the anus, similar in intensity to that attacking the calves of the legs; the sphincter is rigidly contracted, which the patient distinctly feels, and it impedes or prevents the introduction of a finger for the purposes of exploration. Such attacks generally come on suddenly, and cease as quickly after a short duration, or they disappear gradually, after having given rise to great inconvenience for several days. Besides this transitory affection, there is another contraction of the sphincter, which was first accurately described by Boyer.[1] The following are the pathognomonic symptoms of the complaint: contraction of the sphincter, closure of the anus, so as to render the introduction of the finger or of a bougie, very difficult, intense pain at the margin of the anus, which is increased to the utmost during and after defecation. Constipation, absence of a discharge from the anus, derangement of the general health when the disease has lasted for some time, great irritability and ill temper.

Anal spasm is, at times, induced by reflex irritation proceeding from the rectum and adjoining organs. Thus Boyer has often observed contraction accompanying a fissure of the anus, which becomes visible on examination, and excites violent pain when touched. In several patients hemorrhoidal tumours had preceded, which in some had been extirpated. Infancy and youth are exempt from the affection. The female sex appears to be more subject to it than the male. The disease is not generally correctly understood, and local and general treatment on the assumption of stricture of the rectum, hemorrhoids and the like can only aggravate the evil. Purgatives and enemata at first afford relief, but after a time they become quite inoperative, and fail of giving even momentary relief. Narcotic hip baths and unguents, especially those containing belladonna,[1] have in some instances proved beneficial. Generally speaking, the most permanent good results are obtained by dividing the sphincter ani; this is best done on both sides, and is advisable both in the permanent as in the transitory form of spasmodic contraction.

---

[1] Remarques et Observations sur quelques Maladies de l'Anus, in Journal complém. du Dictionnaire des Sciences Médicales; Paris, 1818, vol. ii, p. 24.

---

[1] Boyer's Prescription is: ℞. Axung. Porc., Succi Semperviv. tect., Succ. Belladonn., Ol. Amygd. Dulc., āā ℥ij.

CHAPTER XIX.

SPASM IN THE RANGE OF THE NERVES SUPPLYING THE MUSCLES OF MICTURITION.

Our knowledge of the movements of this system of muscles in health, has advanced but little, and demands further investigations. Haller[1] denied that the ureters possessed the faculty of contracting on the application of stimuli. Weber found that he could, by applying galvanic stimuli to the ureters of a dog, produce at will distinct transverse contractions, which allowed of no doubt as to the existence of organic muscular fibres in these parts. This peristaltic action undoubtedly exists in morbid conditions as in the descent of renal calculi, and it is manifested by pain. The urinary bladder of a rabbit was seen to contract rapidly and completely under the influence of the rotatory apparatus, and to discharge its contents. Weber saw a vivid contraction occur at the point of contact with the two ends of the conducting wires, in the half-filled bladder of a cat, which rapidly extended over a large portion of the organ, and then gradually disappeared. After a short time, without repeating the irritation, a similar movement again commenced at the point first irritated, and was repeated several times at given intervals. No independent movements have hitherto been observed in the ureter, a negative fact which is in unison with the prevailing view as to the absence of muscular fibres in the part.[2] The same want of agreement as to the movements of the muscular apparatus of micturition generally, also exists, in reference to the antagonism between the muscular fibres of the bladder and of the sphincter. The layer of muscular fibres placed at the lowest portion of the urinary bladder, is still looked upon as the sole sphincter muscle of the bladder; we owe our knowledge of this part to

---

[1] Opera minora, vol. i, p. 383.

[2] See—Shaw, on the Membranous part of the Urethra, in Med.-Chir. Transact., vol. x, p. 339.

Sir C. Bell, who was the first to describe it minutely in his treatise on the diseases of the urethra, vesica urinaria, prostata and rectum (London, 1820,) in which we find numerous valuable physiological disquisitions. But some of the older anatomists, (Winslow, Santorini,) and among the modern, Sir C. Bell[1] and Guthrie[2] have attributed to the muscles lying at the posterior portion of the urethra, an essential part in the functions of closing the bladder; among these the constrictor isthmi urethralis, first discovered by Wilson, and accurately described by Guthrie and Müller, is particularly important. We also find, that as in the anus, the antagonism between the different muscles is manifested by their structure; for the red muscular fasciculi surrounding the membranous portion of the urethra contain transverse striæ, while the fibres of the urinary bladder, exhibiting no striæ, correspond with the muscular fibres of the intestine and uterus. The difference is not confined to the structure of the muscles, but is also exhibited in the nerves, for which the muscular layer of the bladder is supplied with sympathetic nerves, these muscles derive their nerves from the cerebro-spinal system.

In morbid conditions the antagonism continues; spasm, for instance, may attack the muscles of the bladder only (detrusor urinæ), or it is abolished; the occluding muscles may also be involved, and the consequence will be the combined symptoms of ischuria and dysuria.

Spasm of the Bladder—Dysuria Spastica.—There is a frequent and violent desire to evacuate the contents of the cavity, with a painful sense of pressure in the vicinity of the outlet of the bladder, resembling the symptoms of colic. The less urine is discharged the more the desire to micturate, and the pain increases, and these symptoms extend to the neighbouring muscles of the anus and perinæum, whilst the abdominal muscles are not affected. The passage of the sound through the urethra is unimpeded in uncomplicated cases. Painful sensations in the sacrum and thighs occur frequently. It is characteristic that there are longer or shorter free intervals.

Spasm of the Sphincters—Ischuria Spastica.—There is generally a sudden retention of urine, accompanied by a violent constringing pain at the lower vesical region. The action of the abdominal muscles is increased, in order to surmount the difficulty. The muscles of the anus are not unfrequently involved in the spasm. If a sound is introduced, it meets with an impediment at the membranous portion of the urethra. The symptoms of ischuria supervene, the bladder becomes distended, there is great anxiety, restlessness, cold sweat, tympanitic distension and hiccup. All at once the sluices are opened, the urine flows, and the patient experiences a most grateful sensation of well being. When the expellent muscular fibres are at the same time affected with spasm, we find the patient suffering from a forcing desire to micturate, and the paroxysm becomes of the most agonising character.

---

[1] Loc. cit., p. 86.

[2] On the Anatomy and Diseases of the Neck of the Bladder and of the Urethra; London, 1834, p. 16.

Reflex influences are frequent *causes* of vesical spasm; it rarely results from spinal or cerebral affections. The former are often induced by the sensory nerves of the bladder and urethra. Bell[1] has shown that the most sensitive point of the bladder is in the vicinity of the orifices of the ureters, at which part we find the inner membrane more vascular than elsewhere. From this point the action of the vesical muscles, which in health possess an antagonistic character, is excited with as much certainty as the play of the respiratory muscles is induced by irritation of the glottis; we either find the bladder contract while the sphincters are relaxed, or conversely the sphincters contract and the detrusor urinæ is relaxed. Irksome and painful as the introduction of the catheter may be, the patient does not experience a desire to micturate, until the instrument is brought into contact with the point just mentioned, and it produces this effect even when the bladder is perfectly void. So it happens that calculus vesicæ, though it may give rise to pain at any point, only induces the agonising ischuria when the stone touches the neck of the bladder, and ceases at once when the calculus is removed by a sound or by changing the position of the body, as in inverting the head and raising the feet. Every other kind of vesical irritation acts in the same way, whether caused by an arthritic, rheumatic, or inflammatory affection, or by an altered and acrid condition of the urine. On the other hand, irritation of the urethra, and especially of its middle and posterior portion, induces a contraction of the sphincters. The introduction of a thin sound to a certain depth not unfrequently gives rise to spasm, and we may thus explain the spasm of the muscles surrounding the membranous portion, which from time to time supervenes upon strictures of the urethra; for the contraction itself is not of a spasmodic character, as one might be induced to assume, from the term spasmodic stricture being used in contra-distinction of permanent stricture.[1] The reflex irritation which gives rise to spasm of the bladder may also proceed from other organs. Thus Brodie, in his valuable work (p. 303), has directed attention to the fact, that in diseases of the kidneys (lithiasis, nephritis, suppuration) the symptoms often indicate the bladder only, and give rise to violent vesical pains. The intestinal canal, and especially the rectum (piles, particularly after the application of the ligature), and the uterus are still more frequently the sources of reflex irritation. Strangury and ischuria are frequently associated with hysteria. Even dentition is not unfrequently a cause of the complaint. Some parts of the cutaneous covering appear to exert a similar influence. Cold and wet applied to the feet, and especially to the soles, often give rise to sudden spasm of the bladder. As regards the central organs we find that the commencement of inflammatory affections of the spinal cord is at times accompanied by spasmodic strangury, which also occurs in cerebral affections as a forerunner of apoplectic, or a sequel of epileptic attacks, and overwhelming mental emotions, such as fright and great alarm, and especially the fear of death. A judge of the criminal courts related to me that a man, convicted of highway robbery and murder, who was executed some years ago in the town, before mounting the scaffold, prayed to be allowed to gratify the urgent desire to micturate. Even certain mental impressions are capable of inducing a greater inclination to frequent contractions of the vesical muscles; as in other instances they affect the muscular fibres of the rectum. We occasionally meet with hypochondriacal patients, who think of nothing else but the state of their evacuations; I have had a gentleman of this description under my care, who always remained in the vicinity of his house, when he took a walk, in order to be able at once to follow the call of nature. There was another, who had heard that the formation of calculus could be prevented by frequent micturition; after the impression had ceased to harass him, he was still often reminded of it by an annoying sense of strangury.

---

[1] Loc. cit., p. 11.

---

[1] Consult—Bell, l. c., p. 88; Guthrie, l. c., p. 86; and Brodie, Lectures on the Diseases of the Urinary Organs; London, 1832, p. 6.

The prognosis of the complaint must depend upon the causes, the accompanying affections, and the consequences of the spasm. The latter are either manifested at once, as, for instance, by the imminence of uræmia, or they are developed gradually, as in the case of hypertrophy and contraction of the muscular tissue. Nor are the vesical muscular fibres alone subject to these alterations; it is probable that the muscles surrounding the membranous portion of the urethra, may, under the influence of long-continued irritation, enter into a permanent contraction, which may have more to do with the painful attacks than the stricture itself.

In our *treatment* the most important indication consists in removing the source of reflex irritation. If it resides in the bladder, we must select our remedies according to the character of the irritation; if there be inflammatory action, antiphlogistic treatment, in rheumatic cases camphor and warm baths are indicated; we must not overlook the state of the urine as an irritant in exalted irritability of the parts, and in such cases we may suitably employ the injection of tepid water into the bladder, as recommended by Bell,[1] as diluents taken by the mouth do not suffice in these cases. It will also be useful in certain instances to avail ourselves of the fact regarding the most sensitive point of the bladder, as spoken of above; thus the spasmodic contractions of the organ are relieved by the surgical dislocation of the calculus, or by change of position; which may be tried in vesical cramp arising from other causes. The habitual nocturnal enuresis which so often occurs in children is of a spastic character, and dependent upon irritation of the bladder, as first shown by Peter Frank,[2] and of the intestine. The erroneous assumption of debility and paralysis, leads to the useless employment of tonics; by merely changing the position of the child, and instead of allowing it to lie on its back, placing it on its stomach or side, the urine accumulated in the bladder will be more uniformly diffused, and the impression upon the most sensitive point be diminished. If the cause of reflex irritation resides in the urethra, by which the sphincters are rendered most liable to spasm, we must have recourse to surgical interference, especially with a view to the proper treatment of stricture. In these cases the advantage of thick bougies or of catheters, is manifested if there is a temporary retention of urine. Whereas the introduction of a narrow sound increases the spasm, it is relieved by the compression exerted upon the irritated sensory nerves, from which the reflex action proceeds, by a thick sound; in the same manner as the probang with a large button, relieves spasmodic dysphagia. Besides the urinary apparatus, the intestinal canal and the uterus are deserving of attention in a therapeutic point of view, as foci of reflex irritation; there are numerous instances on record, of a permanent cure being effected by purgative treatment, after the bougies and cauterisation had for a series of years been employed in vain, and even to the detriment of the patient.

---

[1] Loc. cit., p. 22.

[2] De curandis hominum morbis epitome, vol. v, de profluviis, pl. i, p. 72.

Palliative relief may be obtained by warm hip-baths, the local abstraction of blood, fomentations of the perinæum, anodyne enemata, and clysters with infusion of tobacco, and by the internal administration of opium and camphor.

CHAPTER XX.

SPASM IN THE RANGE OF THE NERVES SUPPLYING THE SEXUAL MUSCLES.

Besides the differences resulting from the differences of sex, we find that in the same sex, the female, these forms of cramp vary, according as the organism is engaged simply in the preservation of the individual or in the propagation of the species.

In animals we may observe a peristaltic action of the Fallopian tubes and the uterus, both in the impregnated and the unimpregnated condition; Edward Weber states that the uterus of a pregnant bitch very much resembles the small intestines. Like the latter, the uterus, on opening the abdominal cavity and exposure to the influence of the air, exhibits vivid peristaltic movements which take place in constantly recurring undulations that pass along the cornua from the tubes to the azygos portion of the uterus. After the movements had ceased, the organ still contracted at all points touched by the wires, and the resulting contractions continued long after the contact had ceased. Weber[1] has also observed visible contractions in the unimpregnated uterus of a rabbit. On applying galvanic action to recently killed, impregnated rabits, Reil found that such vivid, vermicular movements were induced between the two poles of the uterus, as he had never seen in the intestines; the young were expelled in less than half a minute; in these experiments the negative pole was applied to the orifice, the positive pole to one of the cornua of the uterus.[2] The discovery of Budge,[3] which has been confirmed by Valentin,[4] that irritation of the cerebellum exerts an influence upon the movements of the cornua uteri and the tubes, is very interesting, as well as the observation made by the former,[1] that movements are induced in the uterine horns by irritation of the clitoris, in the same way as movements of the fundus vesicæ result from irritation of the orifice of the urethra.

---

[1] Loc. cit., p. 27.

[2] Ueber das Polarische Auseinanderweichen der ursprünglichen Naturkräfte in der Gebärmutter zur Zeit der Schwangerschaft und deren Umtauschung zur Zeit der Geburt, in Reil's und Autenrieth's Archiv für die Physiologie, vol. vii, p. 434.

[3] Untersuchungen über das Nervensystem, No. II, p. 82.

[4] Repertorium, vol. vi, p. 327.

The history of the normal contraction of the uterus must assist us in forming our opinion of the spasmodic action of the organ. The muscular tissue of the uterus has been undeniably demonstrated by the microscope, and exhibits the same progressive development as seen in the embryo; but although no other organic muscle is so accessible to direct and indirect exploration, and although since the suggestive investigations of Reil, which must always remain an imperishable monument of ingenious conception and able exposition, our knowledge of the uterine movements during the act of parturition, has been much advanced, especially by Wigand, it is undeniable that certain deficiencies still continue to exist. The latter writer[2] has even raised doubts as to the contractions assumed to take place at the fundus uteri, for his observations lead him to assert that the contractions, in each labour pain, commence at the os uteri, and are propagated to the fundus. The antagonistic activity is apt to be too exclusively referred to the upper and lower segment of the uterus alone; but the abdominal and perinæal muscles also stand in an antagonistic relation in labour pains, and even the sphincters of the anus and bladder are involved.

Spasmodic labour pains.—Convulsive uterine pains, like the spasms of the bladder, occur in two forms; there is either an increase of the expulsive function without any resistance of the sphincters, or there are concurrent contractions both at the fundus and the cervix, in the abdominal and perinæal muscles; the parturient effort is combined with a counteracting force. Both varieties have one feature in common, which consists in an alteration of the normal pains, both as to time and locality.

In the first form, the pains from the commencement occur

---

[1] Loc. cit., No. I, p. 163.

[2] Die Geburt des Menschen in Physiologischer, Diätetischer und Pathologisch-therapeutischer Beziehung, 2d ed.: Berlin, 1839, vol. ii, p. 140.

with the greatest violence, following each other with very short intervals, or without making any pauses; they dilate the passages rapidly and forcibly, and expel the infant suddenly and violently. The pains are considerable, and the fundus of the uterus may be felt externally to be in a state of constant tension. The movements of the child are not to be felt. The second form, for a detailed account of which the reader is referred to Kilian's[1] treatise, 'Die Krampfwehen,' creates an impediment to the process of parturition, accompanied by forcing efforts. The cyclical order of the pains is abnormal; a pain suddenly attains its climax, which it maintains for a lengthened period, and then sinks with the same rapidity. The contraction is partial or unequal; or if general, the fundus does not possess the necessary power to overcome the resistance of the uterine orifice; and the latter not being conquered, is as much contracted as the former; it is so high up that it is difficult to reach it in exploration, at the same time it is distorted or elliptic. The position and form of the uterus is altered; it is drawn more or less to one side, so as to resemble a large hourglass, either in an horizontal or an erect position.[2] The degree of tension and the direction of the membranes are also changed. The contractions (die abspringenden Wehen) are not confined to the uterus; they affect the adjoining sphincters, and even other muscles, e.g. those of the thigh. The uterus presents increased sensibility, which manifests itself on mere external touch, but still more on touching the os uteri. The labour pain is frequently of extreme intensity, and takes an unusual course, passing beyond the pelvis, and affecting the course of the sciatic nerve. It attains its highest point in those cases in which the spasm induces a stricture of the uterus. Wigand[3] was the first to speak of it as a tetanic affection, and Kilian has described it as residing in the lower segment of the uterus, at the internal orifice, where a separate circular layer of muscular fibres is said to exist. According to the observation of my friend, Dr. C. Mayer, it is the external orifice of the uterus which is most frequently subject to spasmodic contraction. The contraction occurs very rapidly, and is accompanied by a pain suddenly mounting to the highest point, and causing boring and racking sensations in the sacrum and bladder, with a sense of violent bearing down, as if the child were on the point of tumbling out. Kilian also looks upon the rapid formation of a tumour on the presenting portion of the child, which is immovable even during the most violent forcing down, as a characteristic feature. In spasmodic labour pains the affection easily and frequently passes from the nerves of the uterus and the adjoining parts, to other nervous tracts. Vomiting, pain at the præcordia, eructations, sobbing and respiratory spasms, often supervene; the central organs of the nervous system are not unfrequently implicated, and we find a change in the state of the patient's spirits; there is delirium, syncope, collapse, vertigo, cephalalgia, unconsciousness, sopor, or universal convulsions, symptoms which are at times accompanied by a remission or cessation of the uterine spasm.

---

[1] Die Krampfwehen, ein Beitrag zur Lehre von den Dynamischen Geburtsstörungen, in: Organon für die gesammte Heilkunde, vol. i, pp. 167—199.

[2] Wigand; loc. cit., p. 158.

[3] Loc. cit., p. 159.

The causes of the supervention of spasmodic labour pains are generally reflex influences proceeding from the uterus itself or its contents; these spasms generally occur after parturition, rarely in miscarriages or premature labour, and most frequently in primiparæ, or such as have borne many children. Increased sensibility of the uterus, caused by a rheumatic, inflammatory, or gastric irritant, and exalted by unnecessary and rude manipulations, is often at the bottom of the occurrence; not unfrequently it is due to an irregular position of the child, premature discharge of the liquor amnii, dragging at the umbilical cord, or retained coagula, which may give the after-pains a convulsive character. It has not as yet been determined whether spasm of the uterus may be induced by reflex irritation proceeding from adjoining organs, the rectum or the bladder. Among the centric causes emotions are the most frequent.

In our prognosis we have to consider two individuals, the mother and the child; generally speaking, spasmodic labour pains are of serious import to both; in extreme cases, the stricture may encircle the neck of the child if the head presents and is low down, or compress the liver and then produce fatal results; Kilian[1] reports a case in which the compression produced a rupture of the liver; the mother's life is perilled by the exhaustion of the vital powers, or by the occurrence of rupture and inflammation of the uterus. Excepting the stricture, there is nothing that enhances the danger of the affection more than the state of the cerebral organs. In the variety first described, which Wigand terms Ueberstürzung der Gebärmutter (summerset of the uterus) pernicious hæmorrhages are to be most feared.

---

[1] Loc. cit., p. 177.

The correct diagnosis of spasm of the uterus is of extreme importance as regards the *treatment* of the parturient female; it is the best preventive of the frequent and injurious operative interference which is adopted on the supposition of mechanical impediments; such proceedings are dangerous for mother and child, and they are to be the more reprobated as the spasms are augmented by manipulation of the uterus. We must attend to the etiology of the case, and have a regard to the individual demands of the patient's constitution. Gastric irritation not unfrequently precedes, and an emetic given at the commencement of the attack may convert the spasmodic action into normal contractions. In plethoric well-fed females, of a rigid fibre, who have gained flesh during pregnancy, have often suffered from swellings of the feet and hands, and from cerebral and thoracic congestion, and whose entire habitus during the act of parturition proves the existence of plethora, by the brilliancy of the eyes, a red, livid face, increased temperature, accelerated, full, or hard pulse,—in such individuals antiphlogistic treatment should be adopted in its full extent; on the other hand, hysterical females, who have previously suffered from dysmenorrhœa or chlorosis, and were subject to spasms, with a pallid face, cool, dry skin, small, quick, thready pulse, great anxiety, and jactitation,—require antispasmodic and soothing remedies, in the shape of small doses of opium, ipecacuanha, a potash bath, oily inunctions, warm fomentations of the abdomen and genital organs, and enemata. The treatment must, in the second place, be modified according to the intensity and form of the spasm. When the contraction amounts to a stricture, it is necessary to induce a sudden collapse; and nothing is more effectual for this purpose than a copious venesection made while the patient is sitting up, followed by a full dose of opium. The experienced accoucheurs of our metropolis have not found that the application of belladonna ointment to the os uteri, so highly praised by some, is of any use. My esteemed friend, Dr. C. Mayer, has found the slow and careful injection of tepid oatmeal gruel, or water, into the cavity of the uterus, to be followed by very beneficial results in those cases in which after the waters have broken, the uterus firmly encircles the entire child. For those hurried pains, which are chiefly rendered dangerous by the supervening hemorrhage, Wigand recommends rest and the horizontal position in bed, and the exhibition of half a grain of opium, with from five to eight grains of nitrate of potash; if there be also an unusual rigidity of the os uteri, or the other parts of the sexual organs, a copious venæsection, even ad deliquium, may be advisable.

We possess no data to determine the existence of spasmodic action of the unimpregnated uterus. The absence of muscular fibres in the virgin uterus renders its occurrence impossible in that condition of the organ; but it has not been determined by the aid of the scalpel, or of the microscope, whether, in females who have borne children, the muscular tissue entirely disappears; both in the parenchyma of the uterus and in the round ligaments, the muscular tissue and its functions, have been established by the excellent researches of the second Meckel.[1] Reil[2] observes: "the uterus sometimes descends in a spasm to the vagina, with an insupportable sense of a hot body being forced out; when the spasm remits, the organ returns to its normal position." We can scarcely do otherwise than assume this statement to have been based upon a local examination, for the sensations of the patient are apt to deceive her; as in the case of hypogastric neuralgia, where, in spite of the sensations of weight and pressure upon the uterus and vagina, there is no change in the position or direction of these parts.

Besides the muscular fibres of the uterus, there is another muscle in the sphere of the female pudenda, which, though rarely, may be attacked by spasm. It is the constrictor cunni whose contraction is under cerebro-spinal influence, and may be effected spontaneously. The narrowing of the introitus vaginæ, which is thus induced, may amount to an actual constriction, as occasionally happens during cohabitation.

---

[1] In—Rosenberger; Dissert. de viribus partum efficientibus generatim et de Utero speciatim, ratione substantiæ musculosæ et vasorum arteriosorum: Halæ, 1791.

[2] Archiv für Physiologie, vol. vii, p. 437

Spasm in the muscles of the male genital organs.—In adult rabbits, dogs and cats, Edward Weber[1] found that application of the conducting wires to the vasa deferentia, produced very vivid peristaltic contractions, so that they twisted and turned violently, and thus underwent a permanent change of position. In the male sex, the influence of the cerebellum upon the movements of the testicles and the vasa deferentia has been demonstrated by Budge, and fully confirmed by Valentin. The experiment is of sufficient interest to merit repetition in the words of the author: "By a lucky coincidence I made the gratifying observation, that in an old cat, whose testicles lay in the abdominal cavity, these organs immediately after death, moved, whenever the cerebellum was irritated with the scalpel, or with caustic potash. The effect was such, that whenever the right lobe of the cerebellum, and the right half of the vermiform process were irritated, movement of the left testis ensued, and the reverse. Mere superficial irritation sufficed to produce this result. The movement of the testicles soon became so palpable in this animal, that there could be no doubt as to its reality. I hastened to open the entire skull and the abdominal cavity, and found the testicles lying perfectly still, without any trace of movement. On irritating one side of the cerebellum, the testicle of the opposite side swelled, quitted its position, and rose up so as to form a right angle with the spermatic cord, one side of the angle being directed forwards. If I desisted from the irritation, the testicle returned to its position, and the movement was renewed on renewing the irritation; the experiment was repeated during half an hour with unvarying results. After the first irritation, not three seconds elapsed before the movement followed; subsequently the interval between the irritation and the effect was prolonged. The movement only lasted a short time, and diminished more and more. Alternately with the cerebellum I irritated the cerebrum, the corpora quadrigemina, the thalami optici, the corpora striata, but I have never seen the slightest movement result from the irritation of these parts. In the ductus deferens, the movements were alternately those of elevation and depression, an entire portion being distended and collapsing; in the testicle a general tumefaction of the organ was observed, although I also saw depressions form here and there."[1] To secure the success of the experiment, Valentin states that older animals should be selected, and especially such as are perfectly mature, or in the period of rutting, a remark which also applies to female animals. It is futile to experiment upon young animals. Volkmann[2] has performed five experiments of this kind without observing such phenomena; in one case only he saw the penis violently agitated. We can do no more than guess whether a convulsive increase of this action may take place in morbid states; the seminal discharges which so often occur in irritations of adjoining organs, the rectum and bladder, may be accounted for in this manner by reference to the reflex actions; even in health it is irritation of the glans penis which causes the ejaculatio seminis. Our knowledge of the spasmodic contractions of those muscles of the male organs of generation, voluntary or organic, which derive their motor power from the cerebro-spinal system, is not less incomplete. There are numerous affections which have hitherto been classed under different heads (satyriasis, chorda), which would with more propriety be considered at this point, as well as the spasmodic retention of the semen, of which Sauvages has communicated a few instances, (dyspermatismus hypertonicus and epilepticus.)[3]

---

[1] Loc. cit., p. 27.

Not only those parts of the sexual organs which are destined for coition, but those also possessing formative powers, are subject to spasm. The testicles are liable to be attacked by a peculiar sense of pain and to be drawn up, sometimes on both, but more generally on one side only, and after the attack has ceased they return to their normal position. This convulsive action of the cremaster, which, like the ligamentum teres of the uterus, contains muscular fibres derived from the abdominal muscles, is very apt to associate itself with diseases of the kidneys, and sometimes with hemorrhoids and saturnine colic. I have already had occasion to observe (vol. I, page 285,) that it is sometimes induced by reflex action from irritation of sensitive fibres of the crural nerve.

---

[1] Budge; Untersuchungen, No. I, p. 160.

[2] Handwörterbuch der Physiologie mit Rucksicht auf Physiologische Pathologie, Herausgegeben von Rudolph Wagner: Lief 4, p. 592.

[3] Nosol. Meth., ed. Daniel, vol. iv, p. 667.

CHAPTER XXI.

SPASMS FROM EXCITEMENT OF THE SPINAL CORD.

In our observations and interpretations of the morbid conditions of the spinal cord, we must bear in mind the physiological relations of the organ; while, on the one hand, it is a conductor of the brain, on the other it is a central organ of the nervous system, and as such possesses peculiar endowments.

I. SPASMS DEPENDENT UPON THE SPINAL CORD AS A CONDUCTOR.

Experimental results.—All the experiments hitherto instituted upon animals, show that the anterior columns of the spinal cord are the conductors of motility.[1] The entire absence of motility in the posterior columns has long continued subject to some doubts; the difficulty of isolating the irritation in them, and the admixture of reflex action, rendered the attainment of accurate results very difficult. The experiments, however, of Van Deen, Kürschner, Stilling, Longet, and Eigenbrodt, have placed the matter on a firmer basis. The movements themselves that result from irritation of anterior or posterior columns, differ in character. The former act like peripheral nerves; movements occur on the same side in muscles whose nerves are derived from the spinal cord, below the point injured; whilst in irritation of the posterior columns, the effect is neither confined to the side irritated, nor to the point to which the irritation is applied. It is scarcely possible to touch these parts without inducing movements of all the extremities. There are other experiments which, on account of the avoidance of the reflex phenomena, are yet more decisive. In decapitated animals, the point of a very sharp cataract knife was introduced into the spinal canal, and the membranes detached to a certain distance from the posterior columns;

---

[1] Consult—Eigenbrodt; über die Leitungsgesetze im Rückenmarke: Giessen, 1849, pp. 32—35; a book containing the most recent experiments.

incisions were then made into the middle line, and at the side of the posterior columns, without dragging or injuring the anterior columns; no movement or tremor resulted, though it occurred instantly when the point of the knife was lowered, or passed over the anterior columns.[1] In most recent times, we have received a not unimportant proof, through the narcotic effects produced by the inhalation of ether. In animals that have been perfectly etherised, the electric stimulus excites no effect upon the sensory nerves, but a very marked one in the anterior cords, even when a mechanical stimulus has ceased to produce any effect.[2]

The physiological character marking the convulsions dependent upon the spinal cord as a conductor, is the fact, that the spasmodic symptoms occur on the same side as the one on which the disease is seated. The irritated spinal cord reacts with all the motor fibres which correspond to the extent of the irritant cause, and induces convulsions of those muscles which receive their impulse from this point. Upon this fact we base our diagnosis of the seat of the disease in the different regions of the spinal cord.

Surgical observations would undoubtedly afford the most distinct picture of these spinal spasms; but the injuries of the spinal cord are almost invariably followed by a loss of movement only, as I have already had an opportunity to observe in reference to sensation, (vol. I, page 149.) I have compared the works of Ollivier and others for this purpose, but have not found a satisfactory instance. In morbid states which affect the spinal cord as a conducting apparatus, and are associated with convulsions, the sensory as well as the motor sphere is generally implicated; the affection of the former being manifested by exalted or diminished sensibility.

Processes which take their origin in the blood not unfrequently act upon the spinal cord as a conductor. The doctrine of congestions presents many weak points and defects to criticism; but we cannot refuse to admit the reality of cases in which we must attribute the local or general convulsions following suppressed hæmorrhage, especially hæmorrhoidal and menstrual, to hyperæmia of the spinal cord. The observations of spasm brought on by congestion and hæmorrhage between the meninges of the spinal cord are still more valuable; the seat of the convulsive action in these cases depends upon the seat of the lesion.[1] But it is not plethora only, but also anæmia, which causes a convulsive reaction of the spinal cord. Hippocrates observes that similar effects result from hæmorrhage, or the sudden abstraction of large quantities of blood.

---

[1] Marshall Hall; Abhandlungen über das Nervensystem, aus dem Englischen mit Erläuterungen und Zusätzen von Kürschner; Marburg, 1840, pp. 195—202.

[2] Longet; Expériences relatives aux Effets de l'Inhalation de l'Ether Sulfurique sur le Système Nerveux: Paris, 1847, p. 12.

Besides the alterations as to the quantity of the blood in its relations to spinal convulsions, we must also consider the qualitative changes bearing upon this point. The toxicological experiments performed in modern times have afforded some elucidation on these subjects. The universal convulsions resulting from poisoning by strychnine, when introduced by the mouth, are brought about solely by the influence of the poisoned blood upon the spinal cord; for if, as Stannius[2] has demonstrated, the posterior half of the vertebral column and the spinal cord of a frog, with all the nerves appertaining to it, be separated from every connection with the vascular system, no convulsions occur in the posterior extremities after the application of the strychnine, whilst the phenomena of poisoning are vividly manifested in the anterior extremities. The experiments of Stilling[3] on the communication of the poison by the circulation of the blood in the spinal cord, while it is continuous at one point, by the agency of the close interlacement of capillary network within its substance, are yet more instructive and decisive. Backer[4] had already shown formerly that, even after dividing the spinal cord in dogs, large doses of nux vomica taken by the mouth produced convulsions in the paralysed parts lying below the point of division, —a fact which can only be explained by assuming the agency of the blood. The symptoms occurred the more rapidly if the animal had fasted previously, and also more speedily when the powder was given in a liquid vehicle than in substance. Other poisons operate in a similar manner. We could scarcely find a more appropriate place for the investigation of the creeping disease, as a convulsive affection arising from poisoned blood, than the present.

---

[1] Ollivier; Traité des Maladies de la Moëlle Epinière, 3d ed., vol. ii, p. 119.

[2] Stannius; über die Einwirkung des Strychnins auf das Nervensystem, in Müller's Archiv, 1837, p. 229.

[3] Stilling; Untersuchungen über die Functionen des Rückenmarks und der Nerven: Leipzig, 1842, p. 50.

[4] Backer; Commentatio ad quæstionem physiologicam a Facultate Medica, Rheno-Traject. anno 1828 propositam, &c., pp. 139—154.

CONVULSIO CEREALIS.

Morbus epidemicus convulsivus, raphania, ergotism.

The opinion began to prevail that this affection had become a matter of history, when its occurrence during the last decennia, in certain districts of Germany, though not in the epidemic extension with which it appeared in the 18th century and earlier, again attracted attention.

According to the observations of Wichmann,[1] Taube,[2] and the officer of health, Dr. Wagner,[3] the disease is characterised by the following symptoms:

Many patients experience premonitory symptoms in the shape of painful oppression at the pit of the stomach, heaviness of the head, vertigo, dyspnœa, weakness and debility of the legs. In others the disease at once commences with formication and cutaneous anæsthesia at the tips of the fingers, extending to the arms and legs, and occasionally affecting the face and the tongue. The hands and feet are attacked with cramps of the flexor muscles. The fingers of both hands are bent like hooks, the thumb being pushed under the fore and middle finger in an oblique direction; the wrist is strongly curved inwards, so that the hand assumes the shape of an eagle's beak. The toes are also doubled under the sole of the foot. The spasm extends over the fore and upper arm, which are bent upon one another at an acute angle; over the thigh and legs, and sometimes to the muscles of the nape and of mastication. Trismus and opisthotonos supervene. The spasms, which are generally most violent from morning to the middle of the day, and then diminish or cease entirely, are accompanied by a violent sense of pain, which remits on extension; for which reason the patients urgently implore their friends to stretch their limbs. Consciousness and the activity of the senses is generally unimpaired. The pupil is almost always dilated. Bulimia is rarely absent. The renal secretions and the intestinal evacuations are normal. The skin is of an earthy hue, dry, and covered with perspiration during the convulsions. The pulse and respirations are of normal frequency. The disease may remain at this point, or increase in frequency; in the latter case the convulsions become more violent, and assume an epileptic character; delirium supervenes, and even an idiotic state often presents itself. The lower extremities become paralysed, and the arms tremble. The anæsthesia is so considerable that the patients can expose their hands to the flame of a candle, or hold burning coals, without experiencing any sensation whatever. But the disease is not always developed to such an extent; at times it supervenes suddenly, with violent convulsions, tetanus, orthopnœa, ischuria, vomiting, and sopor.

---

[1] Kleine Medicinische Schriften, p. 12.

[2] Die Geschichte der Kriebelkrankheit: Göttingen, 1782.

[3] Hufeland und Osann's Journal der Prakt. Heilkunde, 1831, 1832, 1839.

When complicated with other diseases, such as smallpox, cholera, inflammations, Wichmann, Wagner, and others have observed that the course of the creeping disease is not interfered with.

The duration of the slighter varieties of the disease extends to three weeks and more, while the violent attacks last a few days. The restoration of health is accompanied by an eruption of furunculi and ecthyma, or by a copious discharge of worms of the genus lumbricus or oxyuris, the rapid and multitudinous production of which parasites in the creeping disease was first pointed out by Taube. The same writer also directs attention to a peculiar change occurring in the nails of several patients. "The nails presented as many as four rough and dark-brown elevated ridges, half a line in breadth, alternating with smooth parts; subsequently I found that, by counting these layers, I was able to inform the patient how often he had been affected, and I never failed in my estimate. After recovery, the growth of the nails removed the roughness, and the surface regained the same smoothness it possessed before the illness."

Relapses and secondary diseases are of frequent occurrence; the former are induced by cold, by a damp and cold atmosphere, and by emotions, even months after the original attack has subsided. Among the secondary diseases, idiocy, epilepsy, and paraplegia are the most frequent; affections of the intestinal canal, chronic diarrhœa, derangements in the functions of nutrition, tabes, and dropsies are also met with. In the violent cases, death sometimes supervenes rapidly, or is induced during the relapses by apoplexy or suffocation.

We possess no cadaveric investigations which could satisfy even moderate demands. The various observers agree as to the fact of the rapid supervention of putrefaction after death.

Careful demonstration has proved incontrovertibly that the exciting cause of the creeping disease is the consumption of rye, which is damaged by the admixture of ergot (secale cornutum). The majority of the older observers agreed as to this point, and in recent times the disease has been exclusively met with where poisoning of this description was traceable.[1] In order to render assurance doubly sure, experiments were instituted both on human beings and animals; although they could not be continued for a sufficient length of time in the former, and the symptoms produced in the latter did not entirely correspond with those of the creeping disease, the results sufficed to prove that the degeneration of the seed produced by entophyta, small fungoid growths (Sphacelia Nees.), termed ergot (mutterkorn), and occurring almost exclusively in rye, produces an injurious effect upon the brain and exerts a specific influence upon the spinal cord. A great deal depends upon the dose and form in which the substance enters the organism. From the experiments instituted by Wright[2] upon animals, with exemplary accuracy, we ascertain: 1. That when the poison is introduced directly into the blood by injection into the veins or arteries, the brain and spinal cord at once become affected; whereas if the ergot is taken by the mouth, symptoms of local irritation of the stomach or rectum precede. 2. That the spinal symptoms (paraplegia or spasms) may precede or follow the cerebral (sopor, &c.). 3. That a concentrated large dose instantly paralyses the powers of the nervous system, whilst smaller doses first induce excitement, and are followed by a diminution of the powers; a very diluted solution producing a gradual sedative action, and exhausting the vital powers, while a different reaction is manifested in different animals, graminivora being less affected than carnivora. In the same way mankind are differently influenced by the ergot, according to the quantity and form in which it is taken. The larger the quantity, and the fresher the ergot, especially if baked in bread or cake, the more certain the disease is to follow; whilst a watery infusion of the secale produces no such effect, but exerts a specific influence upon the motor nerves of the uterus, which is not observed in the consumption of ergot as an article of diet. Taube mentions expressly that pregnancy runs its due course in an ergotised subject. Wright has demonstrated the presence of secale cornutum in the blood of animals poisoned by it; on treating the blood with sulphuric ether, he found it to contain the ethereal oil of secale previously discovered by himself;[1] this oil is recommended as one of the most effectual remedies for the promotion of the labour pains, and for the arrest of violent metrorrhagia, as also for other conditions, especially gastrodynia, in doses of from 20 to 50 drops.[2]

---

[1] See Lorinser; Versuche und Beobachtungen über die Wirkung des Mutterkorns auf den menschlichen und thierischen Körper: Berlin, 1824, pp. 47—60; and Wagner, loc. cit.

[2] An Experimental Inquiry into the physiological action of the Ergot of Rye, in Edinb. Med. and Surg. Journal, vol. lii, pp. 293—334; vol. liii, pp. 1—35; vol. liv, pp. 51—62.

The deleterious influence of secale cornutum upon the human body, is promoted by certain influences. One of these is age; Wagner has found that infancy and youth are most liable to raphania; he met with no case of it after the age of fifty. The mode of life is a still more fertile source; a glaring instance of this is presented to us in the inhabitants of the flats of Lüneburg, of whom Wichmann gives the following description: excepting buck-wheat, honey, and possibly a small quantity of milk, their sole food is rye-meal; the majority of the people had so entirely consumed the last year's supplies of rye, that they did not wait till the rye was thrashed, but as soon as the harvest was brought in, used the grains that fell out spontaneously. These were at once converted into bread, or a vile kind of indigestible cake, dumplings, or porridge, so that their sole article of diet throughout the day was rye-meal. Their beverage was water by itself, or with an addition of honey; at times a glass of brandy was indulged in. Honey was used as a substitute for butter.[3] We may also assume endemic and epidemic influences to be at work, from the great extension of the disease during the sixteenth and seventeenth centuries. Lastly, it is undeniable that the emotions and cold induce a more rapid appearance, and a more frequent return of the disease.

---

[1] Loc. cit., p. 112.

[2] Vol. liv, p. 60.

[3] Edinb. Med. and Surg. Journ., 1840, vol. liii, p. 5.

The ratio of mortality, according to the reports of the physicians of the last century, was from 6 to 9 per cent. Of 600 patients treated by Taube, 97 died, among 429 attended by Dr. Evers, there were 45 deaths.[1] The greatest mortality in either sex occurred between the second and tenth years, the lowest between the age of twenty and thirty. The greatest danger threatens during the height of the paroxysms of the disease. Wagner states that deficient reaction of the intestinal canal, trismus, and extension and adhesion are grounds for a very unfavorable prognosis.

Without the interference of the board of health, treatment is not likely to prove effectual. The authorities should provide ripe old corn for those parties who have no other resources but the new supplies, and they should confiscate the unsound fresh grain. It will be even necessary in such a case to employ force, for mild arguments are not likely to avail much with peasants, who are affected with a disease accompanied by a ravenous appetite. The most suitable treatment consists in evacuating the intestinal canal both by emetics and purgatives; it is not to be forgotten that a great torpor exists; Taube found that it was often necessary to give as much as twenty grains of tartrate of antimony before it produced the desired effect. The best purgative is calomel, in doses of from ten to thirty grains, and it proved the more effectual the more worms passed off. After the evacuations, Wagner recommended the exhibition of opium, which is the more beneficial if perspiration supervenes. If it fails in producing the effect, the exhibition of camphor is recommended; Taube for the same purpose employed warm baths. The painful spasms are best relieved by friction with a warm hand, and especially by extending and bending the limbs with some force. When there is a complication with inflammatory and congestive affections, we are not to be deterred from abstracting blood. Taube gives the preference to the local abstraction, and adds, that the leeches which had been applied once to such patients, invariably died.

---

[1] Taube; loc. cit., p. 827.

SPINAL MENINGITIS.

Among the morbid processes affecting the spinal cord, as a conducting apparatus, inflammation is the most frequent, and it is manifested by corresponding symptoms. Inflammation of the meninges presents features of a convulsive character, it is a subject to which I shall return when I arrive at the description of the diseases affecting the formative sphere (Bildungs-sphäre) of the nervous apparatus.[1]

In spinal meningitis, it is the muscles of the back and neck which are chiefly liable to spasms, varying in degree from mere muscular rigidity to the most forcible contractions, by which the trunk and the head are drawn back. The cramp is rarely persistent, being generally remittent, and recurring spontaneously after a pause, or as soon as the patient is required to make a movement with his trunk. Violent pain is a uniform accompaniment; it is permanent in one point, even during the intervals of the spasms, or is felt all down the back, and attains the highest pitch when the patient attempts to move. In little children I have repeatedly found tubercular meningitis confined to the cervical region, the medulla oblongata, and the cerebellum, while the muscular spasm was limited to a permanent bending back of the head, a species of meningitis which has not yet been accurately described, and may be confounded with incipient disease of the cervical vertebræ.

On the 17th of July, 1832, I was called to see a boy of six months, who was suckled by a healthy mother, but had been ill for a fortnight, a circumstance attributed to a fall from the arm of his nurse. The child lay asleep in his cradle, with his head bent back; and it was unable to change the position of the head spontaneously. If I made the attempt to move it with some force, the child's face became crimson, and he uttered a loud scream. The cervical muscles were tense and stretched. The functions of the brain continued unimpaired, the eye was animated, and the pupil contracted duly. Nutrition was carried on well; from time to time, there were slight twitchings of the extremities, and finally, profound sopor.

---

[1] [This part of the work has not yet appeared in the original; see Editor's Preface.]—Ed.

Death occurred after the disease had lasted four weeks, with violent and enduring convulsions. On examining the cavity of the skull, I found that there was considerable congestion on the surface, and within the brain plastic exudation along the falx, with enormous distension and accumulation of serum in the ventricles, so that on accidentally opening one of them, two teacupfuls of a clear serous fluid issued like a fountain. The form of the ventricle was considerably enlarged. The septum and the walls of the lateral ventricle were softened. The pia mater and arachnoid of the inferior surface of the cerebellum were firmly adherent to each other, and converted into a granular tissue, which presented a rough surface; in this a large number of tubercles of the size of millet seeds, were deposited, forming a tumid mass. The pia mater and arachnoid presented this degeneration, as far as I was able to reach down the vertebral canal with my finger. On lowering the head, a considerable quantity of clear serum ran out of the vertebral canal.

Before the post-mortem took place, I had indicated to several of my colleagues the seat of the lesion, my views of its character being determined by the analogy of the case to a similar one, which I had met with a short time previously. In the month of March, 1832, I was consulted about a female child of six months, which for nine weeks previously had been affected with a rigid retroversion of the head. It could not by any means be bent forwards or to one side. The cervical muscles were very stiff and hard; at the same time there was an almost continuous state of sopor and dilatation of the pupils; the infant, however, continued to take the breast. The upper and inferior extremities were paralysed, emaciated, and flabby. On making the cadaveric examination, I discovered a considerable accumulation of serum in the cerebral cavities, which were dilated to three times their normal size. The foramen Monroi was large enough to admit of the first joint of the thumb. The choroid plexuses contained hydatids. On raising the cerebellum, a serous cyst of the size of a small apple appeared, which was lacerated on attempting its removal, and discharged a considerable quantity of serum. On prosecuting the minute examination, in which I engaged the assistance of my friend, Professor Schlemm, it appeared that the arachnoid, at the point at which it is reverted from the cerebellum to the upper posterior surface of the medulla oblongata, was dilated so as to form a blind sac, terminating in an obtuse point. The arachnoid itself was much thickened and of firm consistency. The preparation has been put up in the museum of the Berlin University.

The two cases thus related, present another feature of interest. In the first there was no stupor nor any other marked interference of the functions of the brain or the senses, until shortly before death, in spite of the hydrocephalus: in the second there was paralysis of the extremities in addition to the comatose stupor. This difference in the symptoms I account for, by the free communication which existed in one child between the serum of the cerebrum and of the vertebral canal, and which was favored by the retroversion of the head; while in the other, this was interrupted by the saccular dilatation of the arachnoid, which necessarily induced considerable pressure upon the brain and the upper part of the spinal cord.

CHAPTER XXII.

SPINAL SPASMS.

CHOREA.—ST. VITUS' DANCE.

THE spinal cord considered as an apparatus of conduction, differs from the peripheral tracts in this, that it not only contains the aggregate of the primitive nervous fibrils, but is also provided with a peculiar arrangement of the fibrils in groups, which renders the excitement of definite kinds of movement possible. As such we must consider the antagonistic and combined movements, which do not require the co-operation of the brain, as proved by experiments performed upon decapitated animals. After removing the brain, we not only see flexion and extension, abduction and adduction, pronation and supination effected, but even find entire series of movements take place, which resemble the normal movements excited by a mental impression for a definite object; thus decapitated geese flap their wings, frogs without their heads exchange the extended lying position for a sitting one, and draw their paws under their belly when they are irritated,[1] &c. These associated movements take place both when peripheral sensory nerves, as well as sectional surfaces of the spinal cord are irritated, and it would appear that the seat of the irritation bears a close relation to the combinations of the motor nerves, and the forms of movement thus induced. Engelhardt was the first to point out that there is a definite antagonism between the functions of the upper and lower half of the spinal cord. Irritation of the spinal cord, by introducing a wire, or by removing individual vertebræ with the contained portion of medulla, as far as the fourth vertebra, produced marked flexion-movements of the limbs; the same species of irritation applied to the remainder of the spinal cord, induced extension movements. The reflex movements were manifested in the same manner, as long as the cord had not been removed as far as the division between the fourth and fifth vertebræ; only flexion-movements were induced in the extremity of which the toes had been pinched, as well as in its fellow.[1] It appears from a few experiments instituted by Valentin, that we may at will induce movements of abduction and extension in decapitated frogs, by irritating the skin of the back at any point, and that again we may cause the movements of adduction and flexion by irritating the skin of the abdomen.[2] Marshall Hall[3] quotes a case of paraplegia and anæsthesia resulting from kyphosis, in which similar symptoms presented themselves. On rubbing the abdominal surface, and the os ilium of the right side, which was deprived of sensation, forcible extension of the right leg ensued at once, (the same was also the case in an observation quoted from Budd further on, see also vol. I, p. 271,) whereas rubbing of the sacral region at once induced flexion of the knee and the thigh.

---

[1] Volkmann; über Reflexbewegungen, in Müller's Archiv, 1838, p. 22.

A due estimation of the mechanism and the functions of the spinal cord by which these movements are grouped together, throws a light upon a disease which has hitherto given rise to much confusion. I allude to the malady known by the familiar term of St. Vitus' dance.

The chief features of this affection consist in combined movements of one or more groups of muscles, independent of cerebral influence, increasing in violence when predetermined movements are attempted, and more or less interfering with the latter. The different forms which the disease assumes have not as yet been sufficiently investigated; the one best known is that occurring in childhood, a sketch of which may serve as our prototype.

The disease for the most part commences gradually, with slight symptoms, which are generally not attended to, or misunderstood. The voluntary movements are unsteady, they are performed clumsily and hastily; the posture is vacillating, so that the patients are unable to sit still for any length of time without moving about on the chair, and moving the arms and legs. There is already a frequent and rapid alternation between supination and pronation, adduction and abduction of the hand, causing any object which was grasped to fall. As the disease progresses, these movements increase in extent and intensity. The arm is jerked up, and thrown forwards, backwards, or laterally; the leg is rotated inwards, and as rapidly outwards. The muscles of the neck and face participate in this irregular action. The head turns with great rapidity to one side or the other; the mouth and the eye open and close; the angle of the lips is distorted, and again resumes its position; the bulb rolls and squints, and the tongue is protruded. Later on, the muscles of the trunk are involved, and all movements, though still occurring in associated groups, degenerate into a violent throwing and tossing. Even the trunk is thrown up, and it becomes a matter of difficulty to keep the patient on his bed. Excoriations and ulcers sometimes result from the violence of the concussion and friction. The muscles of the external and internal respiratory apparatus are rarely attacked; I have only met with three instances in which it occurred. In my work 'Klinische Ergebnisse,'[1] I have related the case of a female, aged 48, who had for eight years been affected with chorea, resulting from a heavy labour. The patient at the same time suffered from an annoying hiccough; inspiration was often accelerated, and accompanied by a loud whistling sound, such as we meet with in contractions of the glottis. In a child of eight years, the choreic movements of the right half of the body were associated with dyspnœa, whistling inspiration, and palpitation. The third case occurred in a boy of eight years, who, without any known cause, was attacked with chorea about Easter in 1847. At first only the muscles of the extremities, of the face, and the eyes were attacked. The affection subsequently left these parts, and seized upon the muscles of respiration. When, in the month of January, 1848, the boy was brought to the hospital, every now and then a rapid and short concussion of the thorax was perceived, invariably accompanied by a brief, snapping noise. When examined naked, it proved that the attack involved the inspiratory muscles, and especially the intercostals, which were quickly drawn inwards. The snap in this case also originated in a spasmodic condition of the glottis. At times, flexion and extension movements were still observed to take place in the upper extremities. Sulphate of zinc and Fowler's solution were prescribed, but proved unavailing. In the beginning of March the affection had extended to the face; tepid baths, with cold affusion of the head and back, were now ordered, and in about five months a cure was effected. Two years have elapsed since and no relapse has occurred.

---

[1] Muller's Archiv, 1841, pp. 206—209.—See also: Harless; uber die functionell verschiedenen Particen des Rückenmarks der Amphibien, in Müller's Archiv, 1846, p. 71.

[2] Valentin; de Functionibus Nervorum Cerebralium, p. 101.

[3] On the Diseases and Derangements of the Nervous System: London, 1841, p. 247.

---

[1] Berlin, 1846, p. 20.

In the majority of instances both sides of the body are affected in chorea; it less frequently attacks only one side; according to Wicke[1] it was unilateral in 58 cases, and universal in 91, out of a total of 149. The statement made by Rufz and others that the left side is more violently and more frequently affected than the right, has not been confirmed. In the 58 cases mentioned by Wicke, the disease affected the left side in 23, the right in 26 instances; in 1 it passed from the left to the right, and in 8 the affected side was not specified. The inferior extremities are never attacked alone, which is sometimes the case with the upper. The relation existing between the voluntary and the spasmodic movements is characteristic; the former almost invariably pass into the latter, and are the more prone to do this the higher the degree of association required. Thus, standing and walking are rendered difficult, grasping certain objects is yet more interfered with, and even becomes impossible. Sydenham,[2] who has also sketched this disease with a masterly hand, already states, that before the patient can raise the cup to his lips he "makes as many gesticulations as a mountebank, since he does not move it in a straight line, but has his hand drawn aside by spasms, until by some good fortune he brings it at last to his mouth; he then gulps it off at once, and so greedily as if he were trying to amuse the lookers-on." If the patient is required to put out his tongue, and to keep it out, he experiences great difficulty in doing it, the tongue is generally drawn back with a jerk. Lastly, we find the combined movements of speaking and swallowing rendered very difficult and interrupted; indistinct speech, stammering and stuttering are very frequent symptoms of the affection. The numerous sympathetic movements are characteristic; the majority of patients are unable to execute any movement determined upon, by itself. The influence of the will upon the spasmodic movements is very limited in the majority of instances. In spite of my frequent and urgent request that the patient should maintain his arm for a time in a definite position, the majority of patients were only able to do so for a brief period; nor does it suffice to support and hold the limbs. On the other hand a remission and pause in the movements occur during a quiet sleep, while, as Marshall Hall has observed, the movements continue if the patient dreams. Watson[1] also states that the movements make a pause during a long drawn inspiration. The relation between sensation and motion is no less deserving of attention; however severe and frequent the movements may be, there is no sense of fatigue or inconvenience. The production of motor power is almost always diminished, hence the relaxed state of the extremities and the incapacity for endurance and fatigue. Except in complications no psychical disturbances are manifested. The movements dependent upon sympathetic nervous influences are generally undisturbed; I have never, although I have especially attended to this point, observed any deviation in the rhythm of the heart's movements. It is not unusual to see rapid growth and emaciation during and after the disease.

---

[1] Versuch einer Monographie des grossen Veitstanzes und der unwillkührlichen Muskelbewegung, nebst Bemerkungen uber den Taranteltanz und die Beriberi: Leipzig, 1844, p. 278.

[2] Sydenham Society's English Edition, vol. ii, p. 258.—Processus Integri, xvi.

The symptoms above detailed generally continue with trifling intermissions, and with but slight remissions in the waking state, for one or several months. It rarely runs a prolonged course, enduring for a series of years, but when this is the case it is less violent, and is confined to single groups of muscles.

The disease may be complicated with other morbid affections, without any interruption or modification of the course of the chorea. Cerebral symptoms often supervene, such as excitement, delirium, mental obtuseness, and sometimes even inflammatory conditions. Bright[2] has found that rheumatic affections, both articular rheumatism and rheumatic pericarditis, are frequent complications and causes of the complaint; my own experience and that of other writers does not coincide with this opinion. I have never omitted examining the heart in chorea patients, even when there were no functional disturbances to draw attention to the organ; but with the exception of two cases, in which the complication was accidental, and in one of which it was only observed after the fifth relapse, brought on by a rheumatic attack, I have not found chorea accompanied by disease of the heart. Addison and Babington,[1] in a great number of instances, have found the first sound of the heart accompanied by a soft bellows murmur. I have only met with murmurs, in chorea patients, in the vessels of the neck, and occasionally in the aorta, in the vicinity of the semilunar valves; but they were solely referable to the anæmic condition of the patient, which gave rise to or accompanied the disease; and they disappeared after a persevering employment of steel medicines. The complication with acute exanthemata, inflammation of the intestines or the lungs, or with pertussis, produces no change in the symptoms of chorea; but the supervening disease is apt, according to Guersant, to assume an asthenic type.[2]

---

[1] Lectures on the Principles and Practice of Physic, 2d ed., 1845, vol. i, p. 641.

[2] Reports of Medical Cases, vol. ii, p. 493; and Medico-Chir. Trans., vol. xxii, p. 10.

Among the predisposing causes the chief is a certain period of life, the greatest susceptibility existing between the second dentition and puberty, especially between the age of ten and fifteen; the second is sex, more than twice as many occurring in females than in males.

From Wicke's[3] collection of 327 Cases, we find that there were 210 females to 117 males; the following table shows the respective ages at which they occurred:

Age.	Males.	Females.	Total.
4	1	4	5
5	5	3	8
6	13	4	17
7	7	16	23
8	5	10	15
9	12	22	34
10	15	28	43
11	13	26	39
12	12	21	33
13	6	18	24
14	11	19	30
15	4	14	18
16	6	5	11
17	6	10	16
18	1	6	7
19	0	4	4
	117	210	327

---

[1] Babington; On Chorea, in Guy's Hosp. Reports, 1841, vol. vi, p. 415.

[2] See—Rufz; sur la Chorée, in Archives Génér. de Méd., February, 1834.

[3] Loc. cit., p. 302.

Rufz states that during ten years (from 1824—1833) there were admitted into the Children's Hospital, at Paris, 32,976 patients, of which 17,213 were boys, and 15,763 girls. Among these, there were 189 cases of chorea, distributed in the following manner :—

Age.	Boys.	Girls.	Total.
1— 4	3	2	5
4— 6	2	3	5
6—10	16	45	61
10—15	30	88	118
	51	138	189

Among 100 Cases collected by Hughes,[1] there were :

Up to the 10th year . . .	33 cases,	11 boys,	22 girls.
From the 10th to the 15th year .	45 „	11 „	34 „
Above the 15th year . . .	22 „	5 „	17 „

The disease appears to occur much more frequently in the northern than in the southern latitudes. It has not been seen in the tropics by physicians who have resided there for a long time (Rochoux, and others). It is rare to trace an hereditary predisposition. Mayo relates a case of congenital chorea and idiocy.[2] The most frequent exciting causes are emotions, and especially fright, they occasionally induce the disease suddenly; thus I remember having a girl of ten years under my care, who was violently alarmed one morning by a dog jumping at her and barking, and was seized with chorea the same evening. When a considerable period supervenes between the causes and the effect, it is probable that trifling symptoms have been overlooked. A mere emotional influence, such as the embarrassment caused by being observed by others, often increases the intensity of the spasmodic movements. It can scarcely be shown to be produced by irritation. Reflex irritation most frequently resides in the intestines and genital organs; but under this head a more important part has been ascribed to helminthiasis than it is found to merit on closer examination.

---

[1] Digest of One Hundred Cases of Chorea treated in the Hospital, Guy's Hospital Reports, 1846, 2d Series, vol. iv, p. 372.

[2] Outlines of Human Pathology, p. 170.

[illegible] whose [illegible] to suffer [illegible] the patient [illegible] began to [illegible] she pre- [illegible] with [illegible] had [illegible] and the [illegible] muscles [illegible] is entirely [illegible] accompanied by [illegible] attracted her [illegible] brought on by [illegible] four months [illegible] was confirmed; but [illegible] pregnancy of the same date, [illegible] Venesection was [illegible] without producing [illegible] so violent that the patient [illegible] and the influence of the [illegible] entirely abolished, that in order [illegible] the head and administer [illegible] speech was entirely destroyed, [illegible] uttered from time to time. [illegible] amount of three ounces and one minim of hydrocyanic acid every hour, were prescribed. On the succeeding day, violent spasmodic labour pains came on, and the patient miscarried with a fœtus of apparently six months old. Soon after, violent convulsions ensued, which lasted through the night. The lochia were normal. The patient had no knowledge of the occurrence of parturition; a drop and a half of hydrocyanic acid being given hourly. On the following day a douche of ten pails of water, at a height of seven feet, was thrown upon the neck of the patient. The night was calmer, and the chorea movements were diminished. On the sixth day after the delivery, a visit from her lover caused a fresh outbreak of violent convulsions, which was calmed by repeating the hydrocyanic acid. Both phalanges of the great toe became gangrenous, and were removed at the wish of the patient. The chorea gradually ceased, and six weeks after, the patient was discharged cured.

The second case, a woman of 23 years of age, who had not been affected with chorea either during her childhood or during her first pregnancy, applied at the hospital on the 8th May, 1846. Four months previously her courses had ceased; she had a peculiar voluble utterance, and there were continuous involuntary movements of both arms and legs. This condition had commenced three weeks previously; it was not noticed by the patient until pointed out to her by her friends. The vaginal examination, which Dr. Schöller made at my request, showed that she was advanced to the fourth month of pregnancy. The movements diminished on the exhibition of sulphate of zinc, and the prolonged use of an infusion of valerian; but they continued up to the delivery at the full period, after which they gradually disappeared.

The third patient was a woman of 24 years of age, who, according to the report of her medical attendant, had previous to the occurrence of menstruation suffered from a severe attack of chorea, with impeded articulation. In her seventeenth year, menstruation was scanty and irregular, and her appearance rather anæmic. From time to time a hesitation in her speech occurred. She married in her eighteenth year, and a few months later becoming pregnant, she was attacked with chorea, the extremities on both sides and the tongue being violently moved. The employment of oxide of zinc, and valerian, and tepid salt baths, with cold affusion, removed the chorea towards the middle period of pregnancy. The delivery and the confinement ran the normal course; a few months later the woman again became pregnant, and remained well during the first half of the term; but was again attacked with chorea during the second half of pregnancy, when it assumed even greater violence than before, but disappeared on the employment of the same remedies. The delivery and the puerperal state passed off without disturbance this time also; four months later she became pregnant for the fourth time, and now the chorea did not reappear.

The following are the results which I have arrived at by a comparison with other cases of chorea occurring in pregnant women. In the majority of cases there had been no chorea in early life, there had been none, for instance, in the five cases observed by Dr. Lever.[1] Several females were exempt during the first pregnancy, and were attacked with chorea during the second. In two cases the chorea returned during the following pregnancy. In a healthy female of 20 years of age, a miscarriage occurred in the third month of the second pregnancy, and a fortnight after she was attacked with chorea of the right side, during the course of which the patient conceived for a third time. The spasms now increased in intensity, and soon after she had quickened, the left side was also attacked. The chorea generally commences at about the third or fourth month of pregnancy, it rarely occurs earlier, and still less frequently during the later months. The period at which it ceases varies, in a few it yielded during the pregnancy to the employment of the suitable remedies; in others it ceased gradually after a miscarriage, and but rarely at once; in others, again, it continued to the full period; in two of the cases communicated by Lever, the choreic movements ceased with the first occurrence of labour pains, never to return. In these patients the puerperal state passed off without any disturbance, and the children presented no abnormal characters. In the symptoms presented by these cases, some peculiarities are observable. The chorea of pregnant females is almost always bilateral, the muscles of the face and the tongue are invariably affected. The intensity of the movements is very marked, and they are often complicated with convulsions of an epileptic character. Many complain of a sense of numbness in the affected parts. The brain is almost invariably affected, and this is shown by headache, vertigo, a wild expression of the features, rolling eyes, unconnected speech, loss of memory, and great irritability. A Jewess, whom Peter Frank[1] had successfully treated when suffering from chorea as a girl, was attacked fifteen years later, shortly after marriage, at the commencement of pregnancy, with chorea more intense than he had witnessed during a practice of fifty years. The spasmodic movements continued day and night, and although perfectly conscious there was the most violent behaviour. The integuments were covered with furuncles and gangrenous spots; all the remedies employed produced no effect, miscarriage ensued at the fifth month, and health was restored at the same time. Ingleby relates the case of a female in the last month of pregnancy, who, for six weeks, had been suffering from violent headache. Soon after a venesection convulsions of the facial muscles supervened, which were communicated to the left arm, and after a second bleeding spread over the greater part of the body. On the evening of the fifth day, the disease attained an alarming height; the patient spoke loud and rapidly, and almost unceasingly, though her conciousness was unimpaired; the movements were so violent and universal that it was necessary to hold her down by force. As, at the same time, parturient pains manifested themselves, it was deemed advisable to rupture the membranes, upon which a dead child was born, without, however, in any way diminishing the spasmodic symptoms. After a short sleep produced by opium, the movements became so much aggravated, that six persons were scarcely able to restrain her. Twenty-four hours later death ensued with symptoms of extreme exhaustion.

---

[1] On some Disorders of the Nervous System associated with Pregnancy and Parturition, Guy's Hospital Reports, 2d series, vol. v, pp. 3—12, and vol. vi, pp. 233—237.

It is quite exceptional to find chorea occurring after delivery, whether at the full period or premature. In the month of August, 1843, a female aged 47, was sent to the hospital, who, nine years previously, had been attacked with chorea subsequent to a heavy and tedious labour. The head and the upper extremities were the chief seat of the spasmodic movements;

---

[1] Jos. Frank; Praxeos Medic. Univ. Præcepta: Lipsiæ, 1841, vol. i, p. 348.

the lower were also affected, but in a less degree. The patient had a tortuous gait; the trunk was twisted as if she were dancing; and she was therefore looked upon as inebriated when walking in the streets.

In boys the development of puberty, and the irritation resulting from onanism, have an undeniable influence in causing chorea. An anæmic constitution affords a frequent predisposition. The rheumatic predisposition noted by English medical men, was rarely traceable in the cases that have presented themselves to my observation. In one healthy girl of 9 years, a few weeks previously violent rheumatic pains had affected the joints of the extremities of the right side, and as they disappeared the choreic movements supervened. Some of my patients I found were influenced by atmospheric changes, thus, a girl of 24 years of age, who, from her fourth year, had been affected with chorea, chiefly of the left side of the body, was seized with violent lacerating pains in the extremities, suffering under the disease when a change of weather occurred, and she was always in much better health in the heat of summer than during winter. In another young female patient, who had been subject to chorea for six weeks, there were no painful sensations, but the movements were much aggravated as soon as the weather became wet and stormy. Among the patients treated by me at the hospital, there was a man of 34 years, who attributed the commencement of his chorea to the suppression of perspiration of the feet; this he restored by a domestic remedy common in Berlin, consisting in introducing the feet into a bag containing living ants with their eggs, while they are being roasted by a hot stone,—the result was that the chorea disappeared,[1] though he had a trifling relapse subsequently. Some medical men state that the second period of dentition favours the occurrence of chorea, and Gregory relates a case of chorea in a boy in whom the second set of teeth appeared before the first were shed; the removal of a considerable portion of the latter induced a cure, and the relapse, which occurred a year later, yielded on the extraction of the remainder.[1] Some writers have assumed direct irritation of the spinal cord and of its envelopes, as a cause. Thus Stiebel[2] considers swelling of the seventh cervical vertebra, with tenderness when touched with the finger, or when a hot sponge is passed over it, as a cause of chorea; he states that he has never failed to find this symptom. In the majority of a large number of cases which I have examined, I have been unable to discover such an alteration; and a comparison with healthy individuals has convinced me that no stress can be laid upon such a projection of the seventh cervical vertebra. Froriep was the first to draw attention to the tumefaction of the odontoid process. I have only once seen chorea result from an inflammatory affection of the spinal cord; it happened in a scrofulous boy of 13 years of age, who, in his fifth year, had suffered from a serious injury of the head, the cicatrix of which was still perceptible in the occipital region. There was violent fever, tenderness of the whole surface, most marked in the dorsal and cervical region, and increased by the slightest movement, constant supine position, incapability to stand, frequent desire to pass water, constipation, and delirium alternating with somnolency; these symptoms rendered powerful antiphlogistic treatment necessary, and this, especially the repeated local abstraction of blood from the head and along the vertebral column, had the desired effect within eight days. A week later convulsive movements of the mouth and the upper and lower extremities supervened, with insecurity in walking and standing, and mental excitement, which was manifested even at night by loud confused talking and restless dreams. After a few days the spasmodic movements were confined to the angle of the mouth and the extremities of the right side, and the loss of control of the spontaneous movements accompanying chorea, gave the boy that singular appearance which non-medical people often look upon as oddity or bad habit.

---

[1] The suppression of perspiration of the feet is much less frequently a cause of convulsive than of paralytic affections. One of these rare cases occurred in the person of a nurse, of 40 years of age, belonging to the clinical wards; from her early life she had been affected with perspiration of the feet; when in January, 1848, it ceased in consequence of her getting wet, and she was attacked with spasm in the extensors of both feet. The attacks, during which the foot was drawn up to the leg, and the toes towards the back of the foot, occurred from eight to ten times daily, and disappeared as soon as the perspiration of the feet had been restored by footbaths containing potassa fusa.

---

[1] Wicke; loc. cit., p. 319.

[2] Kleine Beiträge zur Heilwissenschaft; Frankfurt, a. M., 1823, p. 50.

Death rarely takes place in chorea from exhaustion resulting from the extreme consumption of motor power. Sometimes it is brought on by a complication with cerebral affections and other diseases. The anatomical examinations hitherto made have only yielded the negative fact of an absence of structural changes of the spinal cord which bear a definite relation to the disease. A few observations recorded in modern times may be appropriately introduced here. Hughes[1] relates the case of a man, aged 25, whose disease had begun with stiffness and twitchings of the hands, and more especially of the left. The movements extended to the arms and the face, his speech became laboured, and both feet participated in the affection. The movements became so intense that the patient was thrown out of his bed. They continued without intermission, day and night, depriving him of all rest. The exhaustion assumed a threatening character; the skin was bathed in perspiration, the features sunk, the pulse small, while consciousness remained unimpaired. Tonic and excitant remedies were unavailing. A half-grain dose of acetate of morphia produced no effect; and on administering a second dose, consisting of one grain of opium, the symptoms subsided for ten minutes, but were followed by a fresh outbreak of the movements, during which death overtook the patient, six weeks after the appearance of the disease. On opening the cavity of the skull, thirty-one hours after death, a small quantity of blood was found upon the arachnoid, in the vicinity of the vertex, but it was doubtful whether it had not been effused in consequence of the force used in removing the skull. The right margin of the fornix was much softened; the surface of the third ventricle was swollen, red, and softened. The spinal fluid was opaque, of a yellow colour, and very coagulable with heat. The spinal cord appeared less consistent than normal. There were traces of a slight attack of pleurisy, and pneumonia, and some ecchymoses on the visceral layer of the pericardium and endocardium. The lining membrane of the aorta was saturated with fluid blood, and covered with atheromatous deposit in the vicinity of the heart. The semi-lunar valves were thickened; on one there was an opaque granular deposit, while the other two were adherent, though it could not be determined whether in consequence of a congenital or pathological process. Some red striæ were observed on the peritoneum, as of incipient inflammation. Bright[1] has communicated another instance. A girl, aged 17, was attacked a second time by chorea, with extreme intensity. Death followed, with typhous symptoms. On section, considerable congestion of the cerebrum was found, and about five or six small osseous lamellæ at the pia mater of the lower portion of the spinal cord, which was perfectly normal in all other respects; the right ovary contained a cyst of the size of a hazle nut, filled with red viscid matter, and semi-transparent; osseous concretions were found attached to the fimbriated extremity of the right Fallopian tube, looking like large grains of sand, and of irregular shape. Similar concretions were seated upon the external surface of the broad ligament. We owe the following interesting account to Froriep:[2]—Augustus S—, aged 10 years, had been affected for a twelvemonth with spasmodic movements of the voluntary muscles, which often remitted so as to leave free intervals, but resisted all medication. The boy was admitted into the Hôpital la Charité, in Berlin, on the 8th of July, 1834. The movements presented a most perfect picture of chorea, and affected all the voluntary muscles, the upper extremities and the face being most violently agitated. It was necessary to employ bodily restraint in order to prevent the patient from injuring himself. He constantly moved his head from one side to another, and his face presented constant jerkings and distortions. The latter was crimson, and there were all the symptoms of violent congestion to the head. His consciousness continued unembarrassed. Even during the night the twitchings scarcely ceased; the patient was almost constantly moving during his sleep, and, after a short, restless slumber, he was again woke up by fresh attacks of violent spasms. Deglutition was very difficult, and there was obstinate constipation. On the 13th of July, after a night of uninterrupted convulsions, which successively increased in violence, death ensued from apoplexy. On making the *post-mortem* examination, the larger veins on the surface of the brain, as well as the vessels of the cerebral substance, were found gorged with blood. The cerebrum and cerebellum, as well as the pons varolii, were normal. A shallow impression, resembling a fossa, was found at the lower anterior surface of the medulla oblongata, as if the little finger had been pressed against it. The membranes of the part were opaque, and thickened laterally. Corresponding to this impression, a remarkable alteration was found at the foramen magnum of the occipital bone; it no longer offered the usual transversely oval opening, but presented the shape of a bean, with the hilus directed forwards. On further investigation, it was found that the change of shape depended solely upon a tumefaction of the odontoid process. This process of bone was of the same size and thickness as in an adult man, but merely contained a peculiarly spongy and rather dense tissue, without actual degeneration. The bones of the occiput of the atlas, and the body and arch of the second vertebra, appeared, so far as could be seen, to be perfectly normal. Cruveilhier[1] gives the following report of a case of chorea combined with a paralytic affection:—The patient, a female of fifty-four years of age, complained seventeen years before her death of a numbness in the left, and subsequently in the right, leg. Her gait became irregular. After a time the upper extremities also became involved. During the last three years (previous to coming under observation) the condition of the patient remained the same. Her speech was impeded and interrupted, and even the utterance of a few words was accompanied by grimaces like those of chorea, and the more she attempted to repress them the more violent they became. The lower extremities were much emaciated, the feet extended, and the toes bent; it was necessary to use force to restrain the limbs, as they were otherwise thrown into violent and irregular movements, so as to resemble the fantastic contortions of the puppet whose arms and legs move by drawing a thread. The same phenomena occurred when the patient was required to move her legs spontaneously; she then requested the bystanders to remove to a certain distance, as the slightest effort of the will caused violent jerks and leaps, which she was no longer able to control, and they could only be arrested by mechanical interference. The arms were rather more obedient; she was able to convey solid food to the mouth without difficulty, but she spilt liquids, which therefore had to be given her like a child, with a spoon. Every voluntary movement demanded on her part a preparation, a mental effort. She feared the days on which she was subjected to the examination of the physicians, as she felt the fatigue and excitement consequent upon it for four and twenty hours after. The voice and respiration were weak; she was scarcely sensible to pinching or pricking. She could feel large objects when she had grasped them, but in order to seize and hold small objects she was obliged to look at them. Her intellect was clear. At the cadaveric examination Cruveilhier found an hortensia-coloured softening in the lower occipital convolutions of the left cerebral hemisphere; the spinal arachnoid was opaque and thickened, and more adherent than normally. The spinal cord was atrophied, being reduced by one third of its normal size; the middle and posterior columns were converted throughout into a firm band of grey or greyish yellow colour, which above passed into the restiform bodies, the white layer of which is formed by the lateral columns of the spinal cord. The degeneration extended up to a level with the cerebellum. On making a transverse section of the spinal cord, it was evident that the disease was exactly confined to the middle posterior columns. The posterior roots of the spinal cord were entirely atrophied, transparent and filiform; they offered a strong contrast to the anterior roots which were unchanged. This atrophy was less in the cervical than in the dorsal and lumbar regions.

---

[1] Guy's Hospital Reports, 1846, p. 390.

---

[1] Reports of Medical Cases, p. 489.

[2] Neue Notizen aus dem Gebiete der Natur und Heilkunde, No. 224, p. 7.

---

[1] Anatomie Pathologique, livr. xxxii, p. 19.

I have myself had three opportunities of examining patients who had died of chorea, but in one only could the vertebral column be opened.

An unmarried female of 76 years of age, had been affected with chorea from her sixth year. Her intellectual powers remained undisturbed until the last year of her life, when she became affected with senile imbecility. Her speech was indistinct and laborious during her whole life. The associated groups of spasmodic movements of the extremities, and especially of the arms, were as characteristic after seventy years' duration as in a recent case. The muscles of the trunk were also affected, so that the body was often cast from one side to another. Both halves of the face were affected with histrionic spasm. The muscular power of the legs had much decreased of late years, whilst sensation continued unaltered. For a considerable period the patient had been troubled with pulmonary catarrh and emphysema. She died on the 15th February, 1841, in a state of asphyxia. The cerebrum was atrophied; the gyri were narrow and far apart; in the sulci and between the membranes on the surface, there was a considerable quantity of serous fluid; both crura cerebri were so much softened, that while removing the contents of the skull, the brain tore through at these points; they were of a brownish hue throughout, so that the contrast between the grey and white portions was not marked. The spinal cord was divided and removed as low down as possible; but no alteration in structure or consistency was discovered. On lowering the head but little fluid was discharged from the vertebral canal.

The second case occurred in a boy of 10 years, who was affected with chorea of so intense a character, as I had never seen it previously. Both sides of the body were the seat of the disease; by day the muscles of the face, the extremities, and the trunk were in a state of almost constant agitation, with but few remissions; the body was so violently convulsed, that the patient was cast from the sofa on the ground. No movement could be executed by the boy, whether spontaneously or at the suggestion of another person; his sleep was short and restless, so that even at night there was only a brief intermission. Articulation was much impeded, and, at last, it was even arrested altogether. Beyond obstinate constipation, there was no other derangement. I repeatedly instituted experiments on this boy, to ascertain whether irritation of the skin at different points, exerted any influence upon the character of the movements, but I was unable to discover any relation of the kind; even on tickling the volar and plantar surfaces, the movements were neither altered nor augmented. Other agents seemed equally inert as to any influence produced upon the progress and type of the malady. Cold affusion to the head and back was the only thing that increased the spasms. After a duration of four weeks, an inflammatory affection of the brain supervened. The violence of the movements remitted as soon as coma was manifested. The rapid and excessive emaciation of the patient was remarkable; it was particularly marked in the face, for the child's features assumed the character of senility as we see it in tabes mesenterica. During the twelve hours preceding death, the chorea entirely ceased. The post-mortem examination was made on the 16th of May, 1841. I found the brain very large in proportion to the size of the cranial cavity; on removing the skull-cap, it rose up as if it had been previously compressed. The superficial vascular injection was considerable. The arachnoid was dull, and covered with a quantity of plastic matter lying along the inner margin of the hemispheres. Owing to an accidental lesion, a quantity of clear serous fluid had escaped from the ventricle. The central parts of the brain, the fornix, the septum, and the walls of the lateral ventricle were softened so as to present a pulpy consistency. The corpora quadrigemina were so much softened as to be perfectly diffluent. The normal firmness of the remaining portions of the cerebrum and cerebellum presented a strong contrast to this condition. The medulla oblongata and spinal cord presented no abnormity so far as they could be examined.

The third case happened in a girl of 9 years of age, who for a few months previously had been labouring under a severe degree of chorea associated with movements of the facial muscles, of the head, the trunk, and especially the superior extremities. For three weeks past she had been suffering from a mucous diarrhœa. The belly was distended, tympanitic on percussion, and painful on deep pressure being applied in the cæcal region. This was the condition of the child when it was admitted into the children's wards in the Charité on the 19th of Nov., 1841.

The intensity of the chorea symptoms was not diminished, in spite of the diarrhœa continuing several times a day. Consciousness was unembarrassed, articulation impeded and unintelligible; the emaciation was marked. The skin rough, the tongue moist and clean. This complication induced me first to attend to the inflammatory affection of the intestinal mucous membrane, for which leeches, poultices, and mucilaginous drinks were ordered. The diarrhœa was relieved shortly. On the 22d of the month after a pultaceous motion, the abdomen, which continued tympanitic, presented so great a tenderness, that the very slightest pressure could not be borne. Fluctuation was distinctly perceptible in the abdominal cavity, and the feet were œdematous. These as well as the hands and tip of the nose were cold. The pulse was small and weak, and beat 120 times in the minute. There was much thirst. Eight leeches, fomentations of the abdomen with infusion of chamomile, calomel and digitalis āā gr. $\frac{1}{4}$, every two hours, were ordered. The peritonitis increased in intensity; while the chorea movements were much diminished. The face became distorted, the fæces and urine passed away involuntarily, the patient lay immovably on her back, and there was œdematous tumefaction of the lumbar region. Five drops of the oil of turpentine were ordered to be given every two hours in an emulsion, accompanied by terebinthinate frictions of the abdomen. On the 25th the belly was somewhat sunk, the quantity of the urine increased, but the tenderness continued the same. Every touch caused a weak scream which soon passed into a continuous low cry. The oil of turpentine, the external application of which had produced a slight erythematous redness, was continued. On the following day the distension and fluctuation were found to have increased, there was œdema of the legs and thighs, unconscious discharge of urine and liquid yellow excrements, short, oppressed respiration, and a dry hacking cough. On the 27th the death struggles commenced, and the fatal issue occurred the same evening. The cadaveric examination was made on the following day, and it proved that the brain was healthy, that there was slight softening of the dorsal and cervical portions of the spinal cord, while the lumbar portion presented a firm consistency. The peritoneal cavity contained a very considerable amount of dull, brownish-yellow fluid; the pelvic portion of the peritoneum was the seat of intense inflammation, and a large quantity of yellowish-green, thick pus was found in it between the bladder, the uterus, and rectum. The abdominal parietes and peritoneum presented nothing abnormal. In the small intestine adjoining the cæcum, there were patches of congestion and cicatrices of former ulcers. The cæcum and a portion of the ascending colon were intensely inflamed, the mucous membrane was swollen and eroded at several points. I regret that at the time these cases occurred to me I was unacquainted with Froriep's observation of the enlargement of the odontoid process; the point was therefore not attended to.

The *prognosis* of chorea, is, on the whole, favorable, it is to be remembered that there is a tendency to one or more relapses, at longer or shorter intervals after the first attack; thus, in a girl, a clinical out-patient of nine years, five relapses took place with a tolerably uniform interval of one year. When the malady is very intense, it occasionally leaves a few convulsive grimaces and gesticulations, which continue throughout life. Some writers assert that it induces idiocy, but I have not myself met with a case corroborative of the statement.

Chorea occasionally gets well spontaneously, on the appearance of the catamenia, and in pregnant women after parturition. In recent cases therapeutic interference generally owes more to the vis medicatrix naturæ than we are quite willing to admit. This is proved by the fact that the disease very uniformly extends to four weeks and more, under the most various modes of treatment. We rarely succeed in cutting the disease short. Cases of this kind, which have come under my observation, affected young girls during the development of puberty, who were in a state of psychical and physical excitement. I have found derivation to the intestinal canal by the daily use of purgatives of very decided benefit. The removal of the cause, when feasible, is not necessarily followed by a cessation of the disease; at times, however, we may, by attending to this point, arrest the chorea. Thus, I saw a boy, aged 6 years, in whose fæces the mother not unfrequently discovered traces of ascarides; on the employment of calomel and jalap powders, which brought away a large quantity of the oxyuris vermicularis, the patient rapidly recovered. In pregnant females, in whom the intensity of the choreic spasms carries with it excessive exhaustion, even artificial abortion may be justified.

It would be useless to enumerate the various remedies recommended; those only are deserving of our confidence which are able to arrest the disease in a short space of time. The foremost among these, an experience of several years has taught me to be arsenic. I have already published some proofs of its efficacy in the 'Klinische Ergebuisse,' (1846.)

A girl of 11 years had been affected for eight years with intense chorea, especially of the right half of the body, the neck and cervical muscles being also much agitated. According to the mother's statement, the disease made its appearance after an attack of smallpox, and all the remedies applied for a series of years had proved ineffectual. On the 22d of November, 1842, Fowler's solution was ordered for the first time, but was omitted again for a time, when after a week slight toxic symptoms were manifested. It was then again given in increasing doses; a marked improvement was manifested at the end of January, 1843, and in March the patient had entirely recovered from the chorea of eight years' duration; she continued free from it, as she assured me on applying for relief in 1849 for a paralytic affection of the face, caused by rheumatism. In another patient, a girl of 10 years, the chorea, which had been brought on by a sudden fright, had continued for two years. Purgatives, preparations of iron, and cold affusion of the head and back, had been employed in vain by other medical men. Fowler's solution was ordered on the 29th of January, 1844; on the 19th of February the symptoms presented a marked abatement, and on the 5th of May the patient was discharged cured. In the spring of 1850 I was called to a case of chorea of extreme intensity in a foreign family, which had persisted for six months. The patient, a girl of 8 years, after a previous attack of articular rheumatism, had for half a year been affected with chorea, to such an extent that she could neither walk nor stand, nor speak articulately; when awake her violent movements rendered it necessary for several persons to hold her, and she was much emaciated. All the remedies tried had failed. The use of Fowler's solution continued for eight weeks, and taken in doses of four drops three times a day, established the cure. Arsenic does not prevent relapses of chorea; but I have found that they are more amenable to this powerful agent than even the first attack. The proper precautions being used, I have never seen the slightest evil result occur, even in children, from the use of arsenic; I do not order more than from three to four drops three times a day, and I dilute them with treble the quantity of distilled water. A trifling inflammation of the conjunctiva is the first symptom of the poisonous effects of the remedy, which demands that it should be set aside for a few days.

Many powerful voices have been raised in favour of iron, and there can be no doubt that it is very efficacious in anæmic constitutions. Different authors have spoken in favour of different preparations. German physicians prefer the hydrocyanate of iron in doses of from three to eight grains, according to the age of the patient. English physicians are in favour of the carbonate of iron, given in large doses. The latter, also, recommend the sulphate of zinc in increasing doses, up to half a scruple and more; it has not merited such praise in the cases that have fallen under my observation. Among the baths Baudelocque affects those prepared with the sulphuret of potash (four ounces to sixteen pails of water), and their efficacy has been tested in the Parisian hospital for children. The average duration of treatment was twenty-four days, whereas it is commonly thirty-one days.[1] Ordinary electricity and electro-magnetism are likewise to be recommended.[2] When we employ the latter, the best plan is to draw sparks from the spine. In 35 out of 36 cases treated in this manner, a cure or considerable amelioration was effected in a brief space of time. The diet should not be too sparing and lowering; even a moderate use of wine is found to be beneficial. Fatigue, especially of a mental kind, is injurious. It is necessary that the patient should reside in a pure atmosphere. Sea-baths are suitable for after-treatment.

Besides the chorea which is connected with the period of development of the second dentition and puberty, and with pregnancy, there is a morbid condition, which, in addition to other symptoms, often displays the characteristic movements of chorea. We allude to mercurial tremor, which we shall examine more in detail in the sequel. But even if there be no tremor, the peculiar relation of the choreic movements to the voluntary movements, is occasionally exhibited in mercurial poisoning. To mention a single instance, Travers[3] gives the history of a looking-glass maker, who was not affected with the ordinary symptoms of tremor, but with sudden spasmodic movements of the limbs whenever he attempted a voluntary movement. The patient was able to sit quietly on his chair, but when he rose up and attempted to walk in a definite direction, his legs became so violently and rapidly agitated against his will, that he was almost thrown down. The upper extremities behaved in the same way; he was, therefore, unable to carry a glass to his mouth. His speech was also indistinct. Mental excitement or embarrassment very much increased the spasmodic movement, so that even examining the pulse, if the patient's attention was directed to it, gave rise to great subsultus tendinum.

---

[1] Rufz; loc. cit., p. 106.

[2] See—Guy's Hospital Reports, 1841, vol. vi, p. 87.

[3] Travers; A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System; London, 1835, p. 399.

CHAPTER XXIII.

SPASMS DEPENDENT UPON THE SPINAL CORD AS A CENTRAL APPARATUS.

The reflex power inherent in the spinal cord as a central organ of the nervous system, when abnormally exalted, is the source of spasms which till recently were imperfectly understood, as their physiological basis was unknown.

SPASMS ARISING FROM INCREASED REFLEX EXCITABILITY.

Experiments upon animals shew that reflex movements depend not only upon the kind, the seat and the intensity of the irritant applied, but also upon the condition of the reflex excitability. At the commencement of the experiment the slightest sound induces movements, but the longer it lasts the more powerful stimuli are required. After a pause the weaker stimuli may again suffice to produce the phenomena. The less the excitability, the more limited will be the movements, provided the intensity of the stimuli continues the same. Thus, when a considerable time has elapsed after the decapitation of an animal, we are no longer able by irritating a limb to excite movements in other parts besides the one irritated.[1] The younger the animal the greater its reflex irritability, a function which is also more developed in spring and autumn than in summer or winter. The loss of cerebral conduction exerts a great influence upon the increase of the power. After decapitation even those stimuli produce reflex action, which did not do so previously.[2] Lastly, there are certain substances which increase the reflex excitability; strychnine and opium belong to this class. A lesion of the spinal cord after decapitation also increases the susceptibility to reflex stimuli.

In man we find similar conditions to hold good with regard to the increase of reflex action as in animals. When the cerebral impulse is interrupted, and the conduction of the will arrested, the reflex phenomena not only become more evident, but they also break forth with greater force. We recommend our readers to consult the observations illustrative of this point collected by Marshall Hall[1] and Budd.[2] We quote the following case from the writings of the latter, as particularly instructive:—

---

[1] Volkmann; über Reflexbewegungen, in Müller's Archiv, &c., 1838, p. 23.

[2] Volkmann; loc. cit., p. 32.

A man, aged 27, had become paraplegic after an injury of the lower cervical vertebræ. The sensibility of the paralysed parts was much diminished, especially in the feet; the motor power returned to the hands on the thirtieth, and to the feet on the sixty-ninth day. During the first week tickling the sole of the foot only induced trifling movements of the foot, and not even invariably; on the ninth day, the movements became more vivid, and up to the twenty-sixth they increased in extent and intensity. At first the tickling of one sole merely induced movements in the corresponding foot, subsequently of both feet, and on the twenty-sixth day, not only of the lower extremities but also of the trunk and the arms. Tickling the left sole, on which the epidermis was raised by a blister, produced more violent and extensive twitchings than when the right sole was tickled. From the twenty-sixth to the twenty-ninth days, the reflex movements were excited by the following causes: in the lower extremities they were induced by the passage of flatus through the intestines, or by touching the penis with the cold urinal; pulling out a hair from the mons veneris gave rise to convulsions of the upper extremities, and of the trunk. On the forty-first day a hot metal plate was applied to the sole of the foot, and excited more violent movements than any stimuli previously used; they lasted while the plate was held to the foot, but although it drew a blister, the patient was perfectly insensible to it. A plate of the ordinary temperature gave rise to no movements after the first contact. Ice applied to the soles did not induce any more violent movements than a body of the ordinary temperature. Pricking the legs, or plucking hairs from them, exerted the same influence as titillation. The introduction of the catheter gave rise to convulsions of the trunk and the members. These also occurred during and after an evacuation from the bowels. (In the other patients the reflex movements and twitchings were also most violent during defecation and micturition.) There was a frequent outbreak of convulsions in the muscles of the legs, arms and the trunk, without any external exciting cause. As soon as the cerebral conducting power began to return, the patient was enabled in a measure to control the reflex movements, but only at the expense of a powerful effort of the will. The first attempts made by the patient to walk had a remarkable appearance, as the tendency to involuntary movements continued, and even in standing the knees at first bent forcibly. On the ninety-fifth day this symptom manifested itself as soon as the individual had walked a few steps. The legs then began to bend upwards; this the patient counteracted by rubbing his stomach, upon which his feet became extended by jerks. On the one hundred and forty-first day he was able to walk by resting against a chair, and pushing it forwards, yet his gait was tottering, and resembled that of a chorea patient.

---

[1] On the Diseases and Derangements of the Nervous System; London, 1841, pp. 230—239.

[2] Contributions to the Pathology of the Spinal Cord, in Medico-Chirurg. Transac., vol. xxii, p. 153.

We find that the reflex excitability of man may, even while the cerebral conduction continues unimpaired, be exalted by causes acting either by means of the blood, or by irritation of the spinal cord, or of peripheral nerves of sensation. We reckon among the former two poisons, one belonging to the vegetable kingdom, the alkaloid strychnine; the other of an animal origin, the poison of hydrophobia. Among the latter we have to notice traumatic irritation, sexual and rheumatic irritation, &c. Organic diseases of the spinal cord may also be accompanied by an exaltation of the reflex function, as demonstrated by the following instructive case given by Hutin.[1]

"J. V., æt. 31, was admitted into the hospital of Bicètre in 1819, when he presented the following symptoms: the sense of touch was generally exalted to such an extent, that on applying the tips of the fingers to any part of the body, a peculiar painful tremor, and corresponding muscular contractions, were perceived, resembling those produced by an electric discharge. If in assisting him in the ordinary wants of life, for instance, in changing his linen, the body was touched or moved, the patient was seized with universal epileptic convulsions, his limbs became rigid and contracted, he coiled himself up as it were, the eyes rolled about in their sockets, and his face was frightfully distorted. The pulse was frequent, small, and hard; respiration slow and profound, the appetite tolerably strong, and the organic functions were regular. The gait of the young man was very peculiar; he was constantly jumping, and he did it in the most singular manner; he feared to put his feet to the ground, on account of the painful impression it caused, and which almost overcame him. There was an excessive restlessness in his movements, yet his muscles developed no power. During the last fortnight of his life, a violent diarrhœa, and an almost constant vomiting supervened. The partial and general convulsions were excited by the most trivial causes; his sensibility was in a state of such extreme exaltation, that the contact of the bed coverings or articles of dress was painful; the excitement did not allow him a moment's rest. The patient died at last in the most terrific convulsions, prostrated and exhausted. *Sectio cadaveris:* The cerebellum was visibly atrophied; its medullary centre, as compared with that of another subject, was a third less in size in either hemisphere. The white substance, which in the normal condition occupies the centre of the corpus rhomboidale, had ceased to exist, so that the fimbriated margins of this portion approached the centre, and only formed a small pyriform, very hard, grayish-brown body. The spinal cord, from the foramen magnum to the dorsal region, was hypertrophied to such an extent, as entirely to fill out the cavity of the dura mater; it was enlarged in the remainder of its extent, but in a less marked degree. Its tissue was very dense, and closely resembled fresh stilton cheese; its inferior portion was less indurated, though more dense than in health, for its consistency was fully equal to that of the pons Varolii. The inner surface of the arachnoid was almost throughout adherent to the cord; underneath it exhibited broad cartilaginous laminæ; the spinal nerves had not acquired a great increase of density; there were distinct symptoms of inflammation.

---

[1] Untersuchungen und Beobachtungen zur Pathologie des Rückenmarkes, in Nasse's Sammlung zur Kenntniss der Gehirn-und Rückenmarks-Krankheiten. Stuttgart, 1837, 2 heft, p. 21.

mation of the mucous membranes in the stomach and the lower end of the small intestine."

Whatever the influence may be that increases the reflex excitability, and however the consequent spasmodic movements may vary, they have one feature in common, that the control exerted upon movements by the healthy brain is in subjection; this gives rise to peculiar psychical relations, and renders the spasmodic phenomena the more entirely dependent upon external stimuli. The feature characteristic of the disease, as an affection of a central nervous organ, consists in this, that all the nervous functions of the spinal cord are implicated; not only the motor, but also the sensory and nutritive energies of the cord are variously affected.

We shall, in the first instance, examine the reflex neurosis proceeding from sexual irritation, which is generally comprised under the comprehensive term—hysteria.

HYSTERIA.

The name indicates the sex which is most liable to suffer from the disease.

The general characters of the affection are: spasmodic movements in the muscles supplied by cerebro-spinal as well as by sympathetic fibres; hyperæsthesiæ, occurring in paroxysms which are easily excited, and vary much both as to time and seat; subjection of the mental powers to the domination of physical reflex action; irritable debility both of body and mind during the intervals; and dependence of the disease upon the condition of the sexual organs.

The attacks are not unfrequently heralded by precursory symptoms; the most frequent are debility, altered spirits, a painful sense of restlessness in the legs, repeated desire to make water, a sense of pressure and constriction at the pit of the stomach and in the throat. The paroxysm, however, often breaks out suddenly, with symptoms that are confined to single nervous foci, or affect the body more generally. The former groups most frequently form in the range of the vagus and the respiratory nerves generally, which are more or less involved in all hysterical complaints; to this class belong the spasm of the glottis, the bronchi, or the pharynx, accompanied by dyspnœa, [illegible] [illegible] [illegible] hysterica, by a sensation [illegible] ascending from the chest to the throat (globus hystericus) [illegible] [illegible] frequent [illegible] cough with a metallic sound, spasmodic screaming, laughing, or crying, and [illegible] a [illegible] [illegible]. Next in order we find the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of the affection, evidenced by [illegible] [illegible] [illegible] [illegible] with irregular [illegible] rhythm, and a sense of [illegible]. The spasm also frequently affects the [illegible] [illegible], especially the nerves of the bladder: the patient suffers from [illegible] and [illegible]. If the disease extends, the reflex action involves the muscles that receive their impulse from the cerebro-spinal nerves: we then meet with tonic and clonic spasms affecting the limbs of one or both sides, the muscles of the back, thorax, and abdomen, in various forms and degrees, from mere tremor and agitation, to the most convulsive movements and contortions. The masticatory and [illegible] muscles of the face take part: [illegible] chattering of the teeth as in the rigor of fever, the sardonic laugh, and a rolling of the eyeballs upwards occur. Coincidently with the convulsions there are hyperaesthesiae in the same or in other parts, and generally of a neuralgic character: they affect the cutaneous surface of the head and face, the back (especially the [illegible] and dorsal vertebrae), the chest and abdomen (especially the [illegible] region of one, or, less frequently, both sides), or the extremities: at times they are confined to a small space, are suddenly increased by superficial contact, but diminish on deeper pressure. A frequent concomitant is the development of gas in the intestinal canal, as well as the secretion of a colourless limpid urine, containing merely the ordinary salts without urea or the organic constituents.

The symptoms are liable to sudden transitions, both as to degree and seat; and it is not a less characteristic feature that the change is often one of striking contrast, excessive sensibility and mobility passing into dulness and immobility, amounting even to paralysis, or profuse secretion alternating with suppression of the discharge. Thus numbness of the hands, syncope, aphonia and vomiting in the observations of older authors,

---

See the remarks on Reflex Paralysis dependent upon Affections of the Sexual Organs, in a subsequent part of this volume.

even asphyxia associate themselves with hysterical attacks. After a duration varying from ten minutes to several hours, the paroxysm often terminates suddenly with a flow of tears or a copious discharge of urine, but not unfrequently it passes off gradually. The course of the sun exerts some influence upon the paroxysms of hysterical patients, the morning excites while the evening calms them.

During the intervals of the paroxysms, the hysterical character of the complaint is indisputably established, and it is these features which support the physiological rationale of the disease. In the first instance, we must take into consideration the increase of reflex irritation which is manifested on the application of stimuli. The extremest case that I have met with, occurred in a trichomatous patient; a Polish female of 28 years, who was early attacked with hysteria; the trichoma which formed in lieu of a critical discharge, had been twice cut off, and had caused an augmentation of the intensity and extent of the spasms; a slight touch of the skin was sufficient to produce the convulsive paroxysms instantly, much in the same manner as twitchings in a narcotised frog. I had scarcely applied my fingers to her wrist to examine her pulse, when her eyelids began to blink, the chest heaved violently, hiccup supervened, and the tongue rolled about in the mouth with a clacking noise. Sir Benjamin Brodie[1] communicates a few instances in which the pressure of a finger upon the sternum instantly caused convulsive paroxysms. Schützenberger,[2] by pressure upon a sensitive ovary, induced the whole series of hysterical symptoms. It is not necessary for this purpose that the impression itself should be painful, though a sudden stimulus appears to operate more energetically. Nor is it irritation of the skin alone, though peculiarly adapted to exciting reflex action, which produces such effects; they also result from other sources of irritation, *e. g.*, intestinal. I have repeatedly observed that even the act of defecation excites and increases the hysterical paroxysms; a fact that corresponds with the above-quoted observation of Budd. The reflex phenomena occurring in the organic sphere are of peculiar interest. A not unfrequent instance is presented in the production and discharge of flatus on touching and rubbing the cutaneous surface. Peter Frank,[1] in his masterly treatise on flatulency, relates, among several other cases, that of an hysterical girl, who distinctly felt, whenever she herself or any other person rubbed any part of the cutaneous coverings, that gas accumulated in the stomach, which was at once discharged with an explosive sound by the œsophagus; and Rudolphi[2] relates the case of a female of advanced age, who was at all times subject to flatulent eructations, but in whom they passed off uninterruptedly as soon as she pressed any part of her abdomen with the finger.

---

[1] Lectures illustrative of certain Local Nervous Affections; London, 1837, p. 62.

[2] See his instructive Essay—Recherches Cliniques sur les causes Organiques et le Mécanisme de la production des Affections appelées Hystériques, in—Gazette Médicale de Paris, 1846, p. 749.

The point of most interest in hysteria after the increased reflex excitability, is the psychical condition of the patient. The main feature is indecision, even amounting to an entire loss of the power of resolution; there is consequently an absence of resistance to extraneous influences, the patient yields herself up to, and is overcome bỳ bodily and mental impressions, such as we see in no other disease; there is, therefore, no attempt at concealing or suppressing the paroxysms. The hysterical motto "I cannot help it," appropriately expresses this condition. In every other respect the mind is free, provided the disease be uncomplicated; and never even, in the most violent paroxysms, is there a loss of consciousness and perception. Besides the psychical character which marks the disease, the peculiarities of the sex also come into play, and the natural vanity, coquetry, whimsicality, tendency to exaggeration, and deception, and gossiping communicativeness of the female become more prominent.

The other organic functions also present changes; the most important of these occur in the uterine system. Abnormal secretions and discharges, as well as derangements of the normal secretions, are frequent; there is leucorrhœa, and the catamenia are irregular and of bad colour. In many cases we find one ovary swollen,[3] and the exploration by the aid of the speculum has afforded instructive illustration of the presence of hyperæmia, inflammation and ulceration in the accessible portion of the uterus. We are now able to present to the eye, what previously the most sensitive finger could not discover in the dark. Among other derangements, we find the development of warmth much interfered with; the temperature is generally reduced or irregularly distributed; while the feet and hands are cold there is circumscribed heat or flushing of the face. The skin and the muscles often present a flabby, faded appearance. Brodie[1] directs attention to a peculiar relaxation of the joints in hysterical females, which is apt to give rise to subluxation. A tendency to hæmorrhages, hæmoptysis, and hæmatemesis often exists. The urinary secretion may be diminished, but it is generally increased, and accompanied by a frequent desire to micturate. Although little food is taken, and there is a special dislike to animal diet, it is not unusual to find the patients become corpulent. The thyroid gland not unfrequently becomes temporarily enlarged.

---

[1] De curandis hominum morbis, lib. vi, De retentione, p. 50.

[2] Grundriss der Physiologie, vol. ii, p. 239.

[3] Schützenberger; loc. cit.

The irritable debility, both of body and mind, occurring during the remissions, is pathognomonic. Mild remedial agents often induce violent and unusual reaction. Much of what is called idiosyncrasy rests upon an hysterical foundation. The influence of sensual and mental impressions is nowhere so sudden and marked as in hysterical subjects. Great timidity and a tendency to be overcome by emotions generally prevails. Nothing is more injurious than debilitating influences, and the attacks at once commence when the powers are reduced below a certain level. This accounts for the proclivity of hysteria to mix itself up with other diseases, which has induced Baglivi to say that "when a disease fails to yield to the suitable remedies, and progresses in a manner different from its ordinary course, we must suspect some latent mental influence (occasionally we may apprehend the venereal disease), or if our patients are females we may assume an hysterical nidus;" this is probably going too far, yet we often have opportunities of convincing ourselves that hysteria causes some confusion by associating itself with other maladies, and especially when they are acute; the unwary will be apt to be led astray by the semblance of important and dangerous conditions. Many a nervous fever which has been suddenly arrested, many a reported case of pericarditis or peritonitis rapidly cured, has been nothing more than a complication of hysteria with a catarrhal or rheumatic fever, or the puerperal state.

---

[1] Loc. cit., p. 71.

If it be of importance to recognise hysteria when supervening upon other diseases, it is equally so to recognise the diseases complicating hysteria, in order duly to estimate the features foreign to hysteria; for people are only too ready to attribute all accessory phenomena to the hysteria itself. Psychical conditions form the most frequent complications, and among these most particularly monomania and ecstasis, the attacks of which combine or alternate with hysterical convulsions and hyperæsthesiæ. We less frequently meet with conditions of abolished or interrupted consciousness, syncope, morbus attonitus (see the section on Logoneurosis[*]), or epilepsy, which, in such a case, assumes an hysterical shading. Diseases of other organs may also combine with hysteria, and, a point not to be overlooked, may be for a long time masked by the symptoms of the latter. This occurs most frequently in pulmonary phthisis and disease of the heart, less so in phthisis intestinalis.

Etiology.—The condition for the origin of hysteria is the sexual maturity of the female; whether at its first development, during its persistence or at its cessation, especially if premature. The age of the individual exerts no influence in the matter, for in the tropics and certain countries of Europe, *e. g.*, Poland, where puberty generally occurs at an early period, a girl of 12 years may be hysterical. There is no doubt of the existence of an hereditary predisposition, and that it may be acquired by a luxurious and indolent mode of life. Debilitating influences are the most fertile sources of hysteria; among these we must mention over-excitement, or discharges, especially of the sexual organs, self-indulgence, imperfect coition, repeated miscarriages, a rapid succession of pregnancies and lactations, leucorrhœa, and menorrhagia. Abstinence from sexual intercourse, especially if previously indulged in, scanty and suppressed menstruation, may also frequently act as causes. Among the reducing causes we must also mention unnecessary or excessive abstraction of blood. The character of the blood, especially the anæmic state, exercises a powerful influence; the best proof of this is given in the hysteria accompanying chlorosis, and by the salutary result obtained by ameliorating the condition of the blood by chalybeates. Other morbid processes, especially the trichomatous constitution, favour the production and the development of hysteria. The foremost among the psychical influences is an erroneous system of education; whether it be lax and frivolous, allowing an uncontrolled play of every impression, or despotic, so as to interfere with every independent manifestation. The example of an hysterical mother developes the disease in the daughters. The emotions most prone to excite it are sentimental love, jealousy, and disappointed vanity. Among the accidental causes, those predominate which cause bodily and mental ennui; permanent and extended position of single limbs or the entire trunk, in consequence of fractures or luxations, or in orthopœdic institutions, tedious manual occupations, knitting, sewing, &c., solitude, absence of the usual amusements, emotions, atmospheric changes, especially intense heat, electric tension and storms, are very apt to excite paroxysms; nor are errors of digestion less influential.

---

[*] [Dr. Romberg has not yet published this part.]—Ed.

Nosology and Diagnosis.—The theories of the disease which have prevailed for centuries, may be divided into two heads; hysteria is referred by one class of writers to the uterine system, and by the other to an affection of the brain. The advocates of either theory employ the arguments taken from the system that prevails at the time; thus, we meet with a series of suppositions and hypotheses, from the rising and wandering of the uterus or its vapours, to the assumption of metritis; from the confusion of the animal spirits, to the conflict of the passions. Let the present generation look into this mirror of the past, and be careful not to believe in the indestructible character of its own views. The reflex theory which is now gaining ground unduly, will have to be confined within its proper limits; we must therefore exercise all the more care in our inquiries. The fact that hysteria originates during the period of sexual maturity, demonstrates the dependence of the disease upon a certain condition of the sexual system; but it is necessary to guard against treating the latter as consisting only of one organ, the uterus, and we must take it in its totality, as frequent experiments upon animals, by excising the ovaries, and a few observations in the human species, have shown that the ovaries exert a more marked influence upon the organisation and the desires, than the uterus.[1] Even within the range of healthy action, this system is a source of stimulation of the nervous apparatus which is manifested in the most varied ways; we need only refer in evidence to the psychical alterations and reflex phenomena, the derangements of the circulation and the secretions occurring during the catamenia, pregnancy, and the puerperal state. These hygienic uterine stimuli also present a point of great interest, which may be employed to form a correct judgment of hysteria; we allude to the frequent absence of local sensations in spite of the existence of violent and repeated stimulation. Some have used this as an argument against the sexual origin of the disease, but independently of the not unfrequent sensations referred by hysterical females to the hypogastric region, we must remember that there is no necessity for sensations to become a matter of consciousness in order to produce reflex phenomena; it even appears that pain prevents the development of the latter, in the same way as gentle contact of the skin in narcotised animals produces movements more easily and more violently than laceration and pinching. Direct experiment also confirms these views; pressure exerted upon the ovarian region, which may be quite free from tenderness or touching the ulcerated points of the os uteri, which are often painless in themselves, may at once give rise to the entire series of hysterical phenomena. It was only very recently that I saw attempts made to replace a tumid uterus which had got wedged under the promontorium, followed by instant and most violent respiratory spasms. Irritation of the uterine system, which is manifested often enough by abnormal processes of nutrition, such as menorrhagia, leucorrhœa, retarded or increased catamenia, or amenorrhœa, operates like traumatic irritation, by the agency of the sensory, or if the expression be preferred, the centripetal nerves, upon the spinal cord; the reflex excitability of this organ is thus periodically exalted and diminished, and we possess the most indubitable evidence of this both during the paroxysms, as well as during the intervals. This is the element in hysteria by which to distinguish it from those spasmodic states, which certainly are induced by reflex action, but are manifested during the ordinary condition of the reflex excitability, the normal relation of the nervous function being restored after the spasm has passed off; numerous instances have been given of this, among the affections in which the motor nerves act as conductors; whereas, in hysteria, the exaltation of the reflex function effects and maintains a change in the entire habit of the individual, a delineation of which, though imperfect, we have attempted above. From the time when hysteria has taken root, the reflex action preponderates throughout the organism, and renders the individual more dependent upon external stimuli. It dominates over the moral energies of the patient, hence the incapability of resistance, the weakness of the will in characterising the disease. This psychical relation has been misinterpreted, and some have gone so far as to look upon the spasmodic laughing and weeping as evidences of prevailing affections of the mind; forgetting that, as in paralysis, sadness or joy may reside under the immoveable features; there may, on the other hand, be an histrionic expression of a mental affection and emotion caused by reflex action, without the presence of a psychical motive; the excitation of laughing by titillation is an everyday illustration of this fact.

---

[1] See—Laycock; A Treatise on the Nervous Diseases of Women; London, 1840, p. 11.

Viewed in this light, hysteria receives not only a nosological, but also a diagnostic definition, by which it may be distinguished from other diseases, and especially from hypochondriasis, insanity, and epilepsy. In regard to the first of these affections, we refer the reader to the features described in the first part of this work (vol. I, p. 185); and we merely point out, that in hypochondriasis the mind excites and maintains the disease, while in hysterical subjects the disease undermines the mental powers. Hysteria is distinguished from insanity by the fact, that in all acts of intellect, subjectivity (the ego) is the ruling genius; self-consciousness is never alienated in the sensations, impressions, and desires, as is the case in erotomania, nymphomania, or in the complication of insanity and hysteria. Lastly, the fits of epilepsy are invariably accompanied by unconsciousness and anæsthesia; whereas, in hysteria, the perceptive powers are not placed in abeyance even during the most violent attacks; a powerful stimulus continues to make an impression upon the nerves of sense and sensation, and increases the spasms; an hysterical patient even during the fit starts when a loud noise is made, and closes her eyes under a brilliant ray of light. The difference is as plainly marked during the intervals; in hysteria we see the evidence of exalted reflex irritability, in epilepsy the expression of psychical depression, obtuseness and weakness of the memory, and in many idiocy, which is never the termination of uncomplicated hysteria, occurs in the course of the disease.

Course and Termination.—The disease, viewed in its totality, generally runs a chronic course, with gradual development, increase and remission of the symptoms, which, at the commencement of the affection, are not unfrequently associated with the catamenial period. Occasionally, however, and especially when hysteria accompanies the development of puberty, the outbreak is sudden and the course rapid. Hysteria does not itself prove fatal; it is only in the ancient authors that we find fatal syncope and asphyxia spoken of as occurring in its course. When death ensues by the supervention of some other disease, the most careful examination fails to detect any manifest alterations in the nervous tissues.[1] Even the danger of other affections is lessened in an hysterical constitution, and this applies not only to nervous phenomena, to symptoms of collapse and immobility, aphonia, ischuria, disturbed and suppressed secretions, tympanitis, &c., but even in dangerous diseases, occurring in hysterical subjects, we must not apply the same standard as in other individuals. It sometimes happens that hysteria passes into other neuroses, as insanity, epilepsy and ecstacy. A transition to chronic inflammation and disorganisation of the parts, which are the seat of the hysterical phenomena (the larynx, the pharynx, in globus hystericus; the bronchi and the pulmonary parenchyma in asthma,) has been spoken of by writers, but we have no guarantee for the accuracy of their observations; and more particularly we are left without that confirmation which the physical method of exploration alone can give, and which, in many cases, may lead us early to the discovery of the changes which were masked by hysteria. A complete recovery rarely takes place before the period of decrepitude; it may cease gradually by resolution (lysis) without distinct crises, unless complicated with other morbid processes, such as trichoma or impetigo, which are removed by the discharges peculiar to them. A pause often takes place in hysteria during pregnancy.

---

[1] See—A few Observations by Sir B. Brodie, loc. cit., pp. 67—69.

Treatment.—The medical man who undertakes the treatment of hysteria must be prepared to exhibit patience, sympathy and firmness. When the moral energy is so suppressed, as it is in this disease, the mere manifestation of a determined will in another produces an imposing effect; still this influence must be exerted considerately and cautiously, and we must be yielding in trifles in order to carry out the plan of treatment with the more rigour and perseverance. On the other hand, we must be on our guard against simulation. Mulieri et ne mortuæ quidem credendum est, applies more especially to hysterical females. It may not be of importance in a medico-legal point of view to determine the existence of deception, as it is in epilepsy, but the patient should never be allowed to attempt a mystification of the physician, without severe reprehension. The criteria which must determine our judgment are the absence of increased reflex excitability, the absence of cold feet and hands during the paroxysms, and of the spasmodic small pulse, the limpid urine, and of the changeability and rapid transition of the phenomena.

The principle upon which our treatment must be based, is the removal of the main condition of the disease, the exalted state of the reflex functions. We possess three different means of doing this: 1st, by removing the reflex irritation, the chief focus of which is the uterus; 2dly, by influencing the reflex function itself; 3dly, by exciting and invigorating the powers of the will.

The first indication presupposes a careful local examination, without which the treatment of hysteria ought no longer to be commenced. In the 'Klinische Ergebnisse' I have already pointed out the value of this exploration, and have communicated a few cases, of which I shall quote the following:—A lady, aged 33, irregularly menstruated, and of a very anæmic habit, was subject to frequent convulsions of the trunk and extremities, during which she generally fell to the ground, but without being deprived of consciousness. The attacks which were announced by an aura mounting from the abdomen to the neck, frequently left tumefactions of different parts of the skin, which soon disappeared. During the intervals she was most variously affected, the symptoms chiefly residing in the range of the respiratory nerves; she suffered from globus hystericus, spasmodic laughing, crying and screaming, spasmodic cough, hiccup, occasionally aphonia and palpitations; her hands and feet were generally cold, and their sensibility obtuse. A very urgent desire to micturate and to evacuate the bowels, the act itself being accompanied with much pain, induced an exploration, from which it resulted that there was fluor albus and anteversion of the uterus, which occupied a lower position than usual. The cervix was swollen and somewhat painful. The patient was recommended to remain in the recumbent position; injections of an infusion of rue were made into the vagina, hip-baths, with an addition of sabina and chamomiles, and the internal use of the mineral waters of Franzensbrunn were ordered. After a few months, the patient was so far recovered, that nothing but the spasmodic action of the respiratory muscles remained. The local treatment of hysteria was the main feature in the therapeutic proceeding of the physicians of the past; but their mode of procedure does not deserve to be imitated, and we agree with Sennertus, who says naively of titillation of the cervix uteri: "frictio ista a christiano medico suadenda non videtur." The speculum has, however, afforded a new basis for the method, and the advances already made and to be anticipated from its aid, can only be compared with the discovery of Laennec; in spite of petty impediments, it will necessarily achieve a victory in the end. In hyperæmia and tumefaction local abstraction of blood is to be advised; from three to six leeches may be applied to the collum uteri, repeated once or twice during the interval of the catamenia, or immediately before or after the menstrual period, if we find it giving rise to an increase of the congestive state. We must, however, avoid letting blood too frequently or too copiously, because in the same degree as the forces sink below the normal standard, the hysterical symptoms will be augmented. Next in order, vaginal injections and hip-baths, first of tepid and subsequently of cold water, are to be employed. If there be excoriations or ulcers at the os uteri and its vicinity, cauterisation with lunar caustic in solution, or in substance, is required; it should be repeated on the fifth and sixth day, and be repeated until a cure is effected. The ulceration not unfrequently extends into the interior of the cervix and must be attacked in the same way; it is interesting to observe, that at the instant of applying the caustic, pain is much less frequently excited at the spot itself, than sympathetic sensation in the ovarian region, especially of the left side, in the sacrum and in one leg; spasmodic attacks in the region of the respiratory nerves are also frequently induced. When lunar caustic does not suffice, the application of the solution of nitrate of mercury, or of potassa fusa becomes requisite; this has also been found efficient in inflammatory induration and hypertrophy of the collum uteri without ulceration.[1] A low position and retroversion of the uterus are not unfrequently dependent upon an inflammatory tumefaction, and are to be combated by the same remedies; whereas, mechanical contrivances, such as pessaries, bandages, and the like, keep up and augment the local irritation and the reflex action upon the cerebral nervous apparatus. Coition produces the same effect, and should therefore be strictly interdicted.

I am the more impressed with the duty of directing attention to the morbid appearances of the uterus, and to the treatment to be based upon it, as I have had frequent opportunities, both in my own practice, and in that of my old friend, Dr. Mayer, who has afforded me the benefit of his extensive experience in obstetrics, of convincing myself of its advantages; while, on the other hand, I have seen numerous instances demonstrating the futility of all remedies while this focus of hysteria, if existing, is overlooked. But we must not expect to find such alterations in all hysterical patients. The question, therefore, suggests itself, whether, notwithstanding, we are justified in applying any remedial agents to the sexual organs as the sources of the reflected irritation. The older physicians recommended injections and suppositories for the vagina, prepared with medicines possessing an undoubted specific action upon the uterine nerves.

---

[1] On these subjects, and on the mode of procedure, the reader may consult the instructive work of J. H. Bennet; A Practical Treatise on Inflammation of the Uterus and its Appendages, and on Ulceration and Induration of the Neck of the Uterus, 2d edit.; London, 1849, pp. 375—471.

℞. Gum. Asafœtidæ, vel Galbani, vel Castorei, ʒij;
Extract. Chamomill., ʒj.
Fiat massa, in partes tres dividenda. Formentur suppositoria tria, unguent. rosaceo oblinenda.

Injections of infusion of rue, valerian, or chamomiles, made in the recumbent position, so as to serve as local baths, were in favour with them. The use of hip-baths has, of late, become almost universal, though the fashionable use of cold water has been carried too far. I have obtained the most beneficial effects from the use of tepid hip-baths in cases of hysteria, in which sexual excitement, with voluptuous dreams, and the ejaculation of a mucous fluid, is followed by extreme prostration. We may, at all events, attempt the cauterisation of the interior of the neck of the uterus with nitrate of silver, the more so if it is accompanied by copious leucorrhœa.

The virgin state of the patients deserves an especial consideration. It is sufficiently known that hysteria not unfrequently occurs with the appearance of puberty, accompanied by painful and irregular menstruation, leucorrhœa, great debility, pains in the lumbar region, in the back, the ovarian region, the hips and lower extremities, and that it resists all the ordinary methods of treatment; the doctrine of spinal irritation, which derives its main arguments from this class of cases, has certainly not contributed to the advancement of therapeutics. Yet on the one hand the natural modesty, and, on the other, the fear of a laceration of the hymen, operate as powerful obstacles, and will continue to delay the employment of the approved local remedies. In many cases, Bennet[1] has found the vagina and hymen so much relaxed and yielding, that a small bivalvular speculum may be introduced without any laceration; but even if we are unable to do this, we should not place the trifling incision of this membrane in comparison with the responsibility we incur of neglecting the proper treatment, and allowing the years of puberty to become a period of misery and disease.

The second indication, which has for its object the quieting of the reflex irritability, is fulfilled indirectly by attending to and removing the disturbances in the relations existing between

[1] Loc. cit., p. 168.

other organs and the nervous system, and directly by applying remedial operations to the spinal cord itself. As regards the first consideration, the blood deserves our most serious attention, both with reference to its constitution as to the relation it bears to the important sexual processes of evolution and decrepitude. The majority of practitioners have rather been inclined to assume a plethoric than an anæmic condition, although the latter predominates in hysterical patients, as is most clearly shown in the hysterical phenomena accompanying chlorosis. The time may not be far distant when the analysis of the blood itself will be required to establish a complete diagnosis; for the present the practitioner must content himself to draw his conclusions, *e juvantibus*, and according to the united opinion of the most trustworthy observers, we possess in the efficacy of iron, the strongest proof of the influence of the blood upon hysteria. A continued use of the various preparations, given so as to suit the peculiarities of the case, renders the blood a normal stimulus for the nervous system. The natural and artificial chalybeate waters for internal administration, and used as baths, are peculiarly appropriate. We must avoid overloading the stomach with large doses, especially of the tinctura ferri; and it is necessary to attend to the constipating effect of the remedy, which may be obviated by the use of Stahl's[1] aperient pills. (Dose from 1 to 3 taken at bedtime.)

I have obtained permanent cures of inveterate hysteria by the prolonged use of the mineral waters of Spa and Pyrmont,[2] of which, even in winter, from one to two wine-glassfuls may be taken the first thing in the morning. If there be a plethoric habit, we should rather seek to restore the normal relation by dietetic and pharmaceutic measures, than by the abstraction of blood. Copious venesection is as little borne by hysterical subjects as other debilitating influences, and its injurious effects are often exhibited at once, though more frequently they are manifested after a lapse of time; small venesections are most likely to prove beneficial in plethoric individuals at the climacteric period. Milk-and whey-cures (serum[1] lactis tamarindinatum, &c.), the grape cure, the acids (sulphuric and phosphoric acid, the elixir acidum Halleri, and the elixir vitrioli Mynsichti), answer the same purpose better. Besides the vascular system the digestive system requires to be attended to, for there are frequent symptoms of gastric and hepatic derangement; in such cases we may ensure a recovery by the use of the Marienbad, Kissingen, and Ems waters, or by the exhibition of alkalies in combination with gum resins, and by enemata. A tonic dyspepsia is a very common complication, which requires to be combated by bitters, such as quassia, the menyanthes trifoliata, and ox gall. We have yet to mention an organic apparatus, which deserves our special attention in the treatment of hysteria, both on account of its important secretory functions, and because, from its large supply of sensory nerves, it bears a close relation to reflex action, we speak of the skin. Baths affect it in the most extensive manner, and a proper selection of the method, the temperature, and the remedial agents to be added to the water, cannot fail to aid the therapeutics of hysteria. Thus, in an erethitic state, the admirable baths of Schlangenbad, and baths of whey, are peculiarly appropriate; in a torpid condition sea-baths and cold affusion to the head and back should be perseveringly employed. The good effect of cold has been more especially recognised of late years, a fact to which we must not be blinded by numerous extravagances that have been committed by the hydropathic school. Inunctions and frictions exert a much less decided influence.

---

[1] [See Editor's note [2], vol. I, p. 190.]—Ed.

[2] [Both these mineral waters are strongly impregnated with a suboxide of iron, and contain, in addition, salts of soda and potass, and other ingredients. Pyrmont, which lies in the principality of Waldeck, near Hanover, is considered the strongest chalybeate on the Continent.]—Ed.

Until very recently we possessed no sufficiently accurate knowledge of remedies capable of depressing reflex action, as contra-distinguished from others, *e. g.*, nux vomica, which possess the power of exalting it. Some experiments instituted upon animals induced Dr. Marshall Hall to assume this influence in hydrocyanic acid, and many physicians laud the effects of aqua laurocerasi in hysteria. Of late we have become acquainted with the influence of anæsthetics, sulphuric ether, and chloroform, in reducing and blunting reflex irritability; at all events we possess in these remedies very powerful palliative means for temporarily removing the pains and spasms of hysterical individuals.

---

[1] [Prepared by boiling three pints of milk, with an ounce of the pulp of tamarinds, and straining; from one to two pints to be taken during the day. The composition of the Elixirs is given in vol. I, p. 89, *note*.]—ED.

The third indication, that bearing upon the moral treatment, is of such importance, that without attending to it we shall fail in other attempts at cure. In order, however, to achieve our object, we must be careful to place ourselves in the proper relation to our patient. Those who abruptly tell an hysterical female that she must exert herself and not yield to her feelings, that her want of energy is the source of her complaint, and the cause of discomfort to her friends, is certain to lose her confidence, and justly so. For how is the patient to acquire the conviction that it is necessary for her to oppose her will to the reflex influence? The physician should show her the means of spontaneously exciting the motor nerves. It is said of Tronchin, the pupil of Boerhaave, who enjoyed the practice among the higher orders in Paris, that he was in the habit of ordering his hysterical lady patients to polish the floors of their own rooms, a practice which was followed with much success. We should scarcely succeed in obtaining obedience to such orders at present, but we possess other means of achieving the same object. Among these I lay great stress upon reading aloud. The ancients looked upon this as a part of their gymnastics, and appreciated its influence upon digestion. Thus, Celsus[1] says, in reference to the former point: "Commode vero exercent clara lectio, arma, pilæ, cursus, ambulatio," &c., and in reference to the latter: "Si quis vero stomacho laborat legere clare debet; si laxius intestinum dolere consuevit, quod colum nominant, indagandum est ut concoquat aliquis, ut lectione, aliisque generibus exerceatur. Prodest etiam adversus tardam concoctionem clare legere." Besides, it gives rise to a mental reaction; and it is very useful even as a palliative remedy, for I know no other which so rapidly dissipates the yawning and other respiratory spasms of hysterical subjects. Gymnastic exercises, the use of dumbbells, swimming, riding, ascending mountains, quick running to a definite distance, are of great use, and may even be employed on the approach of an attack. But we must not forget the maxim which applies particularly to hysterical females — that variety is pleasing. Change in the mode of life and even powerful emotions, are often very beneficial, both in their immediate and consecutive effects.

---

[1] De Medicinâ, l. i, pp. 21 and 25, ed. Targa.

We must have recourse to palliative remedies for the purpose of diminishing the paroxysms and removing single unpleasant symptoms, nor should we ever overlook the accidental exciting causes. An emetic often proves more effectual than the most powerful antihysteric remedies. To the latter belong the antispasmodics that are distinguished by their unpleasant odour, assafœtida, castoreum, ambra, valerian, and some of the preparations of ammonia; the following formula may be recommended:

℞. Aq. Antihysteric. Prag.,[1]
Aq. Rutæ,
Syr. Croci, āā, ℥j.
M. S. cochleare majus pro dosi; vel pro enemate.

I have repeatedly derived, not only a palliative, but also a permanently beneficial result, in the neuralgic and convulsive affections of hysterical females, from the exhibition of arsenic, in doses of from three to four drops of Fowler's solution. There are other cases in which we cannot dispense with the use of opium and morphia.

The sensitive contact (sensible contact), abused by impostors and their victims under the name of animal magnetism, is not unfrequently useful, by diminishing reflex action. In violent convulsions, we may avail ourselves of the withdrawal of the stimulus of light by bandaging the eyes. A general rule to be observed, both in the radical and palliative treatment of hysteria, is, that we should avoid all debilitating influences, and especially the excitement of sudden discharges, because they increase the reflex action, and give rise to unpleasant phenomena. Whatever remedies are required for internal administration, should be prescribed in a pleasing form, and in small quantities. Dark mixtures of eight ounces, piled up pill boxes, which the hypochondriac delights in, alarm the hysterical patient, and create tedium.

The question whether the male sex is exposed to hysteria, is affirmed by some and denied by others; while there are others again who determine the point by ascribing to hypochondriasis in the male sex the same signification as to hysteria in the female. We have already adverted to this opinion, and have demonstrated that it is untenable.[1] If we define hysteria to be a reflex neurosis dependent upon sexual irritation, it may be assumed, *à priori*, that if a similar irritation occurs in the male sex, it will induce like phenomena; experience shows this to be the case. In the anæmic state occasionally accompanying the development of puberty in boys, which, like the chlorosis of girls, may be prolonged into manhood, symptoms of an hysterical character are rarely absent. This is yet more frequently the case in the irritation resulting from masturbation and other sexual excesses. We here find that on account of the loss of vital fluids, the irritable debility soon passes into a torpid state, and the powers residing in the spinal cord fail. The chief difference in the hysteria of the two sexes lies in this; in the male sex it is a transitory affection, which does not acquire so firm a hold as to establish the important psychical relation, independent of the other modifications induced by the uterine system. In the female sex, on the other hand, the source of the disease is permanent.

---

[1] [The Aqua anti-hysterica Pragensis is a distilled water, prepared from assafœtida, valerian, galbanum, castoreum, and myrrh, and other aromatic vegetable substances.]—Ed.

---

[1] See vol. I, p. 185.

CHAPTER XXIV.

SPASMS FROM INCREASED REFLEX EXCITABILITY.

TETANUS.

Next in order to the reflex neurosis originating in sexual irritation, that form comes under our consideration which depends either upon an injury or a morbid affection of peripheral nerves of sensation, or upon an irremediable affection of the spinal cord. We speak of the phenomena comprised under the term Tetanus.

The following are the general characters of the disease: Spasms in the muscles supplied by the cerebro-spinal nerves; permanent exaltation of the reflex function, in consequence of which every stimulus acquires an unlimited influence in exciting convulsions; enduring contraction of the muscles affected with spasm, whether one or more; a rapid course, and imminent danger.

Among the various forms of tetanic affection, none is so fully understood and described as

TRAUMATIC TETANUS.

An interval of varying length elapses between the period of injury and the outbreak of the disease: prodromi occur at this time, with which it is the more important to be acquainted, as they may be easily overlooked from their apparently trivial character. They are a return of pain and tenderness in the seat of injury, even after it has healed and cicatrised. Morgan,[1] one of the most faithful observers of tetanus, relates a case of injury of the hand, in which two months after the wound had entirely healed, and when neither the use of the limb nor external pressure caused pain, a neuralgic pain in the muscles of the thumb preceded the occurrence of tetanus. At the post-mortem examination, two splinters of wood were found in the abductor pollicis, pressing upon a branch of the radial nerve.

---

[1] A Lecture on Tetanus; London, 1833, p. 7.

Horripilations, which are generally misinterpreted as febricitations, are frequent, and may amount to violent rigors, as occurred in one of my own patients. Pain in the neck, accompanied by slight dysphagia, is apt to confirm the assumption of a slight catarrh. The outbreak of the spasmodic attack may occur at the seat of injury, or at a distance from it. In the former case, the muscles of the wounded part contract rigidly, or twitch violently from time to time; this local spasm precedes the general convulsions, like an aura.[1] It is much more usual to find the cramp commencing in the muscles of mastication and deglutition, from whence it extends to the muscular layers of the back, the anterior surfaces of the trunk, and, less frequently, to the extremities; it gives rise to a difficulty or impossibility of swallowing, or of separating the jaws, and induces dyspnœa, retroversion of the head and trunk, and extension of the limbs. The reflex tension is extreme from the commencement; motor discharges into the muscles either occur spontaneously, and convulsive agitation of the trunk and respiratory spasms alternate with free intermissions, or they are excited by the slightest irritation, by pressure upon the wounded part, by touching the skin, by shaking the bed or floor, or by commotion of the surrounding air, by noise, by attempts at deglutition, and even by the effect of the imagination; the mere desire to drink, or to attempt any movement, causes the patient to shudder and start, which prevents him from carrying out his intention. Besides the alternation between contraction and relaxation, between spasmodic attacks and intervals of rest, we find that individual muscles continue in an excessive degree of motor tension, which may even induce a laceration of the muscular fibres. The features themselves denote a state of tension; the sharp outlines giving a peculiar tetanic expression, and causing the patient to look aged. The contraction is most persistent and strongest in the masseters, temporal, and in the cervical and abdominal muscles; agonising pain in the muscles, like that occurring in cramp of the calves, commonly accompanies the paroxysm; and the attempt at extending the contracted muscles, opening the mouth and moving the head. Many patients are heard to complain of intense pain extending with in several instances. Larrey[1] and Curling[2] saw it in the rectus abdominis; Dupuytren[3] in the cervical muscles; and Earle[4] in the psoas major and rectus. Other changes affecting the muscular tissue have already been spoken of at vol. I, p. 281. We may often discover alterations in the peripheral nerves, on close examination, and they are of great importance. Thus, foreign bodies have been found in the seat of injury; in a case recorded by Dupuytren,[5] it was the knot of a whipthong imbedded in the ulnar nerve; in another by Béclard,[6] the knot of a ligature was discovered in the sciatic nerve. The hand of a tetanic patient is preserved in the Anatomical Museum of Berlin, in the volar surface of which a fragment of the twig of a tree was discovered. The nerve has been found partially divided,[7] inflamed, indurated, and thickened[8] in the vicinity of the wound; and these effects have been met with, not only at the seat of injury, but even at a distance, in the course of the nerve to the spinal cord. Lepelletier,[9] in 1826, communicated several cases to the Acadamy at Paris, in which the inflammation was found to have extended along the neurilemma, from the point of injury to the meninges of the spinal cord. In a boy aged 15, three days after the amputation of his leg, the flap having healed, the stump became very sensitive, and twitchings of the muscles supervened; on the sixth day trismus and respiratory spasms showed themselves, and on the eighth death closed the scene. A small abscess was found to have formed in the stump, and there was inflammation in the adjacent parts. The sciatic nerve at this point was softened, of a purple colour, much injected with blood, and presented the same appearance eight or ten inches upwards towards the hip. The pia mater of the spinal cord itself was softened in the middle of the dorsal region. Curling[10] adduces two cases in which the inflammation caused small islets with intervening healthy tissue. Froriep[1] has recently published some admirable investigations, from which it appears that tetanus may be induced by a direct injury of the nerves, both by pressure applied indirectly through the surrounding soft parts, and directly upon the isolated nerve, as well as by puncture, laceration, and contusion; in all the cases, seven in number, the irritated nerves presented a similar peculiar inflammatory change, extending from the seat of injury to the spinal cord, and consisting in nodulated tumefaction and reddening of isolated points separated from one another by tracts of unaltered tissue, alterations which are not found in other cases, and especially where there is no tetanus. Aronssohn[2] first pointed out the occurrence of congestion and inflammation of the semilunar ganglia in traumatic tetanus; and Swan[3] has again directed attention to this subject. As to the post-mortem characters found in the brain and spinal cord, we can only say that they are very inconstant. We find congestion, inflammation, exudation, softening, induration. The limited experience of individual observers has often misled them to form hasty conclusions and misinterpretations. The same applies to the alterations in other organs, the lungs, or the intestinal canal, which depend either upon the fatal issue being caused by asphyxia, or upon complications, or the effect of the remedies employed.

---

[1] Consult—Dupuytren; Traité théorique et pratique des Blessures par Armes de Guerre, pp. 51—54; and Key, in Guy's Hosp. Reports, vol. i, p. 119.

---

[1] Clinique Chirurg., vol. i, p. 122.

[2] Loc. cit., p. 75.

[3] Loc. cit., p. 55.

[4] Med.-Chir. Trans., vol. vi, p. 93.

[5] Loc. cit., p. 57.

[6] Descot; sur les Affections locales des Nerfs, p. 98.

[7] Swan; A Treatise on Diseases and Injuries of the Nerves, new edit., p. 343.

[8] Curling; loc. cit., p. 67.

[9] Revue Médicale, 1827, vol. iv, p. 183.

[10] Loc. cit., p. 73.

In reference to the *etiology* of the disease, we must first attend to the traumatic element. There is no kind of injury, however different in seat or character, which has not given rise to tetanus; but the most frequent causes of the affection are punctured and lacerated wounds, by splinters of wood, nails, &c. (of the 176 cases collected in the dissertation above quoted, 71 belonged to this class), contusions, fractures with comminution of the bone (61 cases), gunshot wounds (33 cases), amputation (11 cases), and, less frequently, other surgical operations, burns, &c. As the extremities are much more frequently exposed to lesions, and especially the hands and feet, it is not remarkable that tetanus most frequently follows injuries of these parts; that of

---

[1] Ueber die Natur des Wundstarrkrampfs und die Behandlung desselben, in: Neue Notizen aus dem Gebiete der Natur und Heilkunde, 1837, vol. i, No. 1.

[2] Lobstein; De Nervi Sympathetici Humani Fabrica, Usu et Morbis, p. 152.

[3] Loc. cit., p. 333.

128 cases put together by Curling, 110 resulted from injuries to the extremities, and of these, 69 to the hands and feet. In most instances, especially in the case of punctured wounds, cicatrisation has already commenced, or has been effected, so that the patient often scarcely remembers the injury, if it was trifling, and a careful examination is necessary to discover it. In a case of tetanus which I examined in 1824, the patient, a labouring man, denied all knowledge of any injury, and it was not until the extremities had been washed that a lesion was discovered on the back of the right foot; it was a hard cicatrix of a puncture received ten days previously by a pitchfork falling upon the limb. Not unfrequently tetanus occurs during suppuration; and while the former runs its course Travers[1] states that the healing process may continue. The period at which the disease supervenes varies; it is the exception to find it occur during the first few hours or days after the receipt of the injury; generally it sets in in the course of fourteen, less frequently of twenty-one days, and still less after this period. The greatest number of attacks falls between the third and tenth days, at least in 112 out of 208.

We know too little as yet of the causes which favour the commencement of tetanus after an injury. We may meet with some differences as to age and sex; thus, 166 patients were from five to forty years of age, whilst there were only 32 in the ages of from the first to the fifth, and the fortieth to the seventieth years; of 252 patients, 210 were males, 42 females; the difference in the latter case is referable rather to the more or less frequent opportunity of injury, and this is also the case with reference to the different ranks and trades. The influence of certain atmospheric climates and psychical relations is more decided. All[2] surgeons, and especially those who have had extensive opportunities for observations on fields of battle and in military hospitals, agree that a sudden change from heat and drought to cold and moisture, is apt to promote the development of the disease.

The sudden impression of a cold current of air or a draught, may often be shown to act as an exciting cause.[1] Dupuytren observed, that tetanus was most apt to occur in hospitals that were badly ventilated, when cold draughts impinged upon the patients. The tropical climates favour tetanus, and the dark races, especially in a state of slavery, are more frequently exposed to it than Europeans. The effect of endemic influences may be gathered from the varying ratio in which the disease is met with in different countries. Thus, in Berlin, even in hospitals, tetanus is a most unfrequent occurrence. Mental emotions exert a considerable influence in producing it, and especially fright by a sudden noise, firing cannon, or alarm-bells at night, which Dupuytren[2] states to have been the cause of its outbreak in many of the sufferers brought to the Hôtel Dieu, during the revolution of July. A more important part in the production of the disease has been attributed, by some authors (Abernethy, Swan), to gastric irritation, inflammation, abnormal secretions in the intestines, and helminthiasis, than we are warranted by established facts in admitting. The cause that has least frequently been observed to give rise to tetanus is difficult parturition. It is probable that, in an etiological respect, the diminution in the frequency of tetanus in modern times may be attributed to the improved and more considerate treatment of the wounded. About the middle of the last century, Lind[3] stated that after amputations five out of six cases terminated fatally; while Sir Gilbert Blane, in his 'Diseases of Seamen' (p. 5), mentions that of 810 soldiers, wounded in April, 1782, in the West Indies, 31 were attacked with tetanus, 17 of whom died. On the other hand, Dickson[4] proves the great diminution of its frequency in modern naval wars, by data contained in his own reports and in those of others; he states that in 33 cases of amputation there was only one case of tetanus.

---

[1] A further Inquiry concerning Constitutional Irritation, p. 301.

[2] Schmucker; Chirurgische Wahrnehmungen, vol. ii, Case VI.—Larrey; Clinique Chirurgicale, vol. i, p. 90.

Diagnosis and Nosology.—The extreme exaltation of reflex irritability is the criterion which distinguishes tetanus from other spasmodic affections that reside in the spinal cord.

---

[1] Hennen, 'Principles of Military Surgery,' 3d ed., vol. [illegible], p. [illegible].

[2] Loc. cit., p. [illegible].

[3] 'An Essay on the most effectual Means of Preserving the Health of Seamen in the Royal Navy,' 1757.

[4] 'On Tetanus,' in 'Medico-Chirurgical Trans.,' [illegible], p. [illegible].

Similar motor discharges, similar spasmodic contortions, occur in spinal meningitis, but the despotism, if I may be allowed the expression, of the reflex function is wanting, which places the muscular apparatus of a prize-fighter under the control of a trifling irritation of the cutaneous surface. This, too, constitutes its distinction from the spasms of individual groups of muscles, such as those of mastication, even when brought on by influences analogous to those by which the tetanic affection is excited, and to which I have already drawn attention in the description of facial spasms. In the divisions of tetanus hitherto made, this element has been overlooked; it follows that they were neither scientifically nor technically advantageous, and even added to the already existing confusion. A meaningless division has been made, according to the difference of the muscular layers attacked by spasm, into trismus, orthotonus, opisthotonus, emprosthotonus, and pleurosthotonus; the last two varieties are extremely rare; trismus may be altogether absent,[1] and in fact it is not the contraction, nor the posture it gives rise to, which characterises tetanus. The distinction as to time—acute and chronic tetanus—is as little tenable as the classification, according to the region affected; the same conditions are the causes of the disease, whether it runs its course in a certain number of hours or days; besides it would be difficult to justify the application of the term *chronic* to a cycle of a few weeks. The nosological distinction between symptomatic and idiopathic tetanus is not permissible, for the centripetal excitement, by traumatic irritation of the nerves, merely bears an etiological relation to the disease, by causing the reflex tension to be augmented. Lastly, we must term as perfectly erroneous the division into an inflammatory and spasmodic form, or, as Curling has proposed, into the acute, the acute inflammatory, and the chronic form. The present matter affords, in addition to innumerable other instances, a proof that pedantic classification cannot serve as a substitute for the absence of pathological truth.

The physiological investigation of the tetanic affection, though not completed, has proved more fruitful. We have already pointed out, that it is not necessary that a *conscious* sensation be excited in order to produce reflex actions; thus by Stannius,[1] that in the tetanus of frogs, produced by poisoning with strychnine, the centripetal nerves experience an extraordinary exaltation of their excitability, or are simultaneously irritated; and that being thus charged, they react upon the spinal cord, and through its agency give rise to the peculiar spasms. The exalted irritability of the centripetal nerves may be observed in every case of tetanus, even if the cerebral sensibility is at zero, as we sometimes see it in individuals of a bœotian stamp. The person who, during the most painful operation, or injury, remains unmoved, starts on being attacked by tetanus, and shudders convulsively the moment his skin is touched. The reflex impulse is not, however, communicated equally to all motor tracts; the cerebrospinal are much more frequently and violently involved than the sympathetic; some even assume the former to be exclusively affected, but whether this is the case is not yet decided; for in order that we may form a correct judgment on the action of the heart in this disease, the pulse alone is not a sufficient criterium, but a careful auscultatory examination is also requisite. The mere increase of the frequency of the pulse during the convulsive paroxysm, cannot be taken as a proof of the spasmodic action of the heart, as all muscular contractions are known to exert a considerable influence upon the movements of the organ. The following observation, recorded by Howship, interesting as it may be, is as yet too isolated to establish a point in pathology; in a tetanic patient, who had complained of violent pains in the region of the heart, and who was examined eleven hours after death, while the body was still warm, the heart was found to be so much shortened, especially in its vertical diameter, that it only occupied the fourth part of the pericardial cavity. The resistance it presented to the touch, was that of an excessively dense or horny body. The auricles and ventricles were much contracted, the walls of the left ventricle were closely approximated to one another, so that on section the cavity was scarcely perceptible. There was about half an ounce of blood in the right ventricle, an ounce in the right auricle, and a much smaller quantity in the left. The heart was removed, and again examined a few hours later, when it was found completely relaxed, larger, and softer.[1] Nor are the sympathetic nerves the only ones that are exempt from the reflex impulse; there are certain sets among the cerebro-spinal nerves which are peculiarly liable to be affected; thus the masticatory and respiratory nerves are frequently affected, while the nerves of the extremities continue in the normal state. A few cases are even related in which the tetanic symptoms were limited to one side of the body, which was the same as that on which the lesion was situated.

---

[1] Dupuytren; loc. cit., p. 54.

---

[1] Ueber die Einwirkung des Strychnins auf das Nervensystem, in Müller's Archiv, 1837, p. 231.

Prognosis and Treatment.—Although tetanus is reckoned among the most fatal diseases, it appears that hitherto the accompanying circumstances (climate, nursing, fatigue, emotions, &c.) have been regarded too little in forming the prognosis. We may satisfy ourselves of this fact by comparing the observations made by medical men in the tropics, and those of army surgeons, with the tables drawn up by Mr. Curling and Dr. Friedrich. In the latter, we see that nearly half the cases were saved, while in the former, as in the case of Macgrigor's[2] report of the Peninsular campaign, among several hundred instances of the disease, there were but very few recoveries. We possess no trustworthy prognostic indications for the individual cases as yet. The safest guide appears to be the course and duration of the intervals between the convulsive paroxysms. If they follow one another very rapidly, and if the reflex tension presents no interruption, when, in fact, the tetanus offers the character of a morbus acutissimus, we must resign all hopes. Whenever a cure has been obtained, the course of the disease was generally of an indolent character, extending over weeks, and the paroxysms being divided by long intervals. Parry[3] lays great stress upon the frequency of the pulse as an indication; he has asserted, that if in an adult the pulse does not present a frequency of 100 to 110 beats on the fourth or fifth day, a recovery may generally be anticipated; whereas the issue is almost certain to be fatal if the pulse mounts up to 120 or more on the first day. Other observers do not support this statement.[4] The state of the respiratory functions is of more consequence in reference to the prognosis; the early supervention and frequent recurrence of suffocative attacks imply great danger.

---

[1] Curling; loc. cit., p. 11.

[2] Report on the Diseases of the Army, in Medico-Chirurg. Trans., vol. vi, p. 449.

[3] Cases of Tetanus and Rabies Contagiosa, 1814, p. 18.

[4] Curling; loc. cit., p. 15.

Observations are on record of spontaneous cures having occurred, even under very awkward circumstances. Macgrigor relates, that a soldier, after a trifling injury of one finger, was seized with violent tetanus during a march. His comrades did not like to leave him behind in a wretched Spanish mountain hamlet, and had him brought on after the regiment in a car drawn by oxen. From 6 o'clock in the morning till 10 o'clock at night he remained exposed to rain, snow, and an alternation of temperature from 52° to 30° F., he arrived at the night quarters half frozen to death, but free from tetanus. Morgan, Astley Cooper, and others, have also seen recovery ensue, in solitary cases, without any artificial assistance, but these were all of the more sluggish form of the disease. The results of treatment correspond with the remarks which have just been made; they amount to this, that whenever tetanus puts on the most acute form, no curative proceeding will avail, whilst in the milder and more tardy form, the most various remedies have been followed by a cure.

The main object of treatment undoubtedly is to remove the source of reflex irritation, and to lower the reflex irritability. Surgical interference is especially recommended in order to carry out the former indication, and in accordance with it nerves have been repeatedly excised or divided, or limbs amputated. The most eminent surgeons of modern times coincide as to the impropriety of performing amputation after tetanus has actually occurred, as the operation itself, as well as its consequences, inflammation and suppuration, will only increase the reflex irritability still more; Dupuytren[1] did not see a good result follow this method, even when the spasm proceeded from the injured part. The success which has followed the division of the irritated nerves, in some instances, is more encouraging; thus, Murray[2] met with a case in which a sailor boy, of 15 years of age, was attacked with tetanus, in consequence of his having run a rusty nail into the sole of his left foot; the accident occurred in the month of August, 1832, during a voyage to Madras, at 9 o'clock at night. He had to keep watch all night, the weather being cold and boisterous, and his foot giving him severe pain. On the following morning at 8 o'clock, he complained of stiffness in the muscles of the maxillæ and neck, which rapidly increased in intensity; his face expressed anxiety, his lips were swollen and livid. The maxillæ were so closely approximated to one another that it was with difficulty that a thin piece of wood could be inserted between them. Two hours later the spasm extended to the muscles of the back, the injured limb felt cold to the touch, and there was tenderness in the vicinity of the wound. The pulse made 120 beats, and the whole condition of the patient indicated extreme danger. As the remedies employed produced no effect, Dr. Murray resolved upon dividing the posterior tibial nerve. It was found swollen to double its size, and after being raised upon an aneurism needle, was rapidly divided; the pain was intense, but the patient instantly opened his mouth, and exclaimed, in great delight, that his leg had come to life again. Three days after the tetanic paroxysms had entirely disappeared, there was no impediment in walking, and the only trace of the injury remaining, was insensibility of the heel and little toe. We possess other records of cases, which, however, are less detailed, and leave it doubtful whether trismus was to be considered as a symbol of a tetanic affection; but whether or no, the division of the nerve by an experienced operator, combined with the employment of the local abstraction of blood, ought to be tried both at the commencement and in the further course of the disease, although it frequently has been ineffectual.

---

[1] Loc. cit., p. 51.

[2] Grainger; Observations on the Structure and Functions of the Spinal Cord, p. 97.

The dietetic regimen must be contrived so as to diminish the excess of reflex irritability. The tetanic patient should be confined in a dark room, at a distance from all noise and disturbing visitors; every unnecessary movement or contact should be avoided, and especially all violent attempts at deglutition, which are almost unavoidably followed by convulsive paroxysms. Such advice as that of Larrey, to introduce a thin tube through the choanæ into the œsophagus, or to extract some of the teeth for the purpose of introducing the medicines, are objectionable. The temperature should be elevated; the atmosphere, as Dupuytren has proposed, be rendered moist and relaxing by the aid of steam. Ambroise Paré[1] cured a patient who was attacked with tetanus a fortnight after amputation of the forearm, by enveloping him in dung; he says in his quaint style: "Or je ne puis obmettre à raconter que quinze jours après survuint au pauure soldat un spasme, lequel j'avois prognostiqué, à cause du froid, et qu'il estoit mal couché en un grenier, là où non seulement auoit peu de couuerture, mais aussi estoit exposé à tous les vents, sans feu et autres choses nécessaires à la vie humaine; en le voyant en tel spasme et rétraction des membres, les dents serrées, les lèvres et toute la fasse tortue et retirée, comme s'il eust voulu rire du rire sardonic, qui sont signes manifestes de conuulsion, émeu de pitié, et desirant faire le deu de mon art, ne pouuant autre chose lui faire pour lors, le fis mettre en une étable en laquelle estait un grand nombre de bestail et grande quantité de fumier; puis trouuay moyen d'auoir du feu en deux réchauds près lesquels luy frottay la nucque, bras, et jambes, euitant les parties pectorales, avec liniments, ci-devant escrits pour les rétractions et spasmes. Après envelloppay le dit patient en un drap chaud, le situant au dit fumier, très bien couuert, où il demeura trois jours et trois nuits sans se lever dedans, lequel lui suruint un petit fluxe de ventre et une grosse sueur. Par ces moyens fut guéri du dit spasme."

On account of the extreme prostration of the nervous power, which accompanies tetanus from its commencement or supervenes during its course, an antiphlogistic, impoverishing diet is unsuitable; and recent experience, especially that of British medical men, coincides as to the propriety of the copious administration of wine, strong broths, &c., in order to counteract the collapse.

The observations hitherto made do not allow of definite indications being fixed for the employment of certain remedies; although some writers seek to establish them with more of pedantry than science. There is no disease in which we feel the absence of genuine therapeutic experience more than here. The imminent danger rarely allows the medical man to be satisfied with one remedy, and even therapeutic incompatibles are fearlessly given one after the other. Nevertheless the prevailing predilection in favour of opium continues, and we

---

[1] Œuvres d'Ambroise Paré, lib. xii, c. 28.

[illegible] necessary to [illegible] channels; [illegible] enemata [illegible] attempts [illegible] worthy of being [illegible] relied upon; [illegible] with an infusion [illegible] ℈ to ʒss of the leaf, to be [illegible] strength of the patient, and the [illegible] It is absolutely necessary to follow its [illegible] wine, volatile stimulants, ammonia, [illegible] for the prostration caused by the remedy is [illegible] a momentary relaxation of the motor tension of the abdominal and masticatory muscles ensues.[5] The greater hopes were cherished from the therapeutic effects of etherisation upon tetanic subjects, as it abolishes reflex action in the normal condition, and because Pickfort's[6] experiments have shown that strychnine produces no tetanic attacks in etherised animals; the hopes that have been raised have only been realised in

---

[illegible] loc. cit., p. 152.

[illegible] p. 318.

[illegible] sur la Fracture de l'Extrémité inférieure du Péroné, in Annuaire des

[illegible]

[illegible] Ricci on the Treatment of Tetanus, in Dublin Quarterly

[illegible] Medicin. vi, 1.

regard to the palliative effect of ether. Dr. Kniesling[1] has carefully observed a case of tetanus, in which chloroform produced the following effects: Unconsciousness and sleep ensued rapidly and at once, without previous excitement; the sopor was complete, the sleep peaceful, and the respiration equable and light. The waking up was sudden, without any transition, and the intellect of the patient was at once perfectly clear. The pulse invariably was retarded after the first few inhalations, without any previous acceleration; at the same time it became fuller and harder, and recovered its softness towards the end of the narcotised state. During etherisation the abdominal muscles were constantly relaxed, the muscles of mastication less tense, and complete lock-jaw did not supervene until death. Chloroform exerted no influence upon the muscular rigidity of the spinal column, and only in a few instances the movements of the trunk seemed again to be painful immediately on waking up. The pupils did not appear to be sensibly influenced. The reflex spasms were entirely arrested so long as the sopor and sleep continued. If the sopor was complete immediately after inhalation, loud noises and rough handling produced no effects; at a later period, a gentle step in the room sufficed to awaken the patient and re-excite the spasms. The efficacy of other remedies is too uncertain to demand a notice here. We cannot even say anything in favour of warm baths or cold affusion, as all handling of the patient promotes an outbreak of the spasms, and instances are on record of death having suddenly supervened in the cold bath. A more important indication consists in keeping the bowels open with enemata and drastic purges. The abstraction of blood, more particularly general and copious venæsection, are not advisable in tetanus, as it increases the exaltation of the reflex functions and accelerates the collapse. In the case of a successful issue, we must protect the patient for a length of time from cold or mental emotions. A patient, who was under the care of Mr. Aston Key[2] and had recovered, died suddenly from the shock of a powerful emotion.

In the treatment of hysteria we have dwelt upon the importance of directing our attention to the mind of the patient.

---

[1] Deutsche Klinik, 1849, p. 74.

[2] Travers; loc. cit., p. 302.

rarely miss it among the prescriptions for tetanic patients, so that we are sure also to find it mentioned in the successful cases. Our distrust is also awakened by the manner in which the doses are played with, the more so when we contrast the use of such enormous doses as 3¾ ounces in twenty-four hours, for eleven days successively, or of more than 4lbs. of the tincture, and 6 ounces 4¾ drachms of solid opium, in ten days, with the observation made by Abernethy,[1] who found 30 drachms of solid opium undissolved in the stomach of a person who had died of tetanus. The tolerance of the stomach appears to be generally diminished in regard to all medicinal impressions, and the power of absorption to be lessened. Travers[2] mentions the case of a patient whose pupils were much contracted, and were not dilated after the exhibition of one scruple of the extract of belladonna. It becomes the more necessary to introduce the remedy into the system by other channels; Dupuytren[3] recommended the employment of opium by enemata in tetanus; and endermic applications, as well as the attempts at transfusion made by Laurent and Percy,[4] are worthy of being repeated. The effect of tobacco appears to be more relied upon; it should be given in the form of an enema, with an infusion of from four to six ounces upon ℈j to ʒss of the leaf, to be repeated according to the strength of the patient, and the violence of the spasms. It is absolutely necessary to follow its use up with strong broth, wine, volatile stimulants, ammonia, alcohol, rum, &c., for the prostration caused by the remedy is extreme, and a momentary relaxation of the motor tension of the abdominal and masticatory muscles ensues.[5] The greater hopes were cherished from the therapeutic effects of etherisation upon tetanic subjects, as it abolishes reflex action in the normal condition, and because Pickfort's[6] experiments have shown that strychnine produces no tetanic attacks in etherised animals; the hopes that have been raised have only been realised in regard to the palliative effect of ether. Dr. Kniesling[1] has carefully observed a case of tetanus, in which chloroform produced the following effects: Unconsciousness and sleep ensued rapidly and at once, without previous excitement; the sopor was complete, the sleep peaceful, and the respiration equable and light. The waking up was sudden, without any transition, and the intellect of the patient was at once perfectly clear. The pulse invariably was retarded after the first few inhalations, without any previous acceleration; at the same time it became fuller and harder, and recovered its softness towards the end of the narcotised state. During etherisation the abdominal muscles were constantly relaxed, the muscles of mastication less tense, and complete lock-jaw did not supervene until death. Chloroform exerted no influence upon the muscular rigidity of the spinal column, and only in a few instances the movements of the trunk seemed again to be painful immediately on waking up. The pupils did not appear to be sensibly influenced. The reflex spasms were entirely arrested so long as the sopor and sleep continued. If the sopor was complete immediately after inhalation, loud noises and rough handling produced no effects; at a later period, a gentle step in the room sufficed to awaken the patient and re-excite the spasms. The efficacy of other remedies is too uncertain to demand a notice here. We cannot even say anything in favour of warm baths or cold affusion, as all handling of the patient promotes an outbreak of the spasms, and instances are on record of death having suddenly supervened in the cold bath. A more important indication consists in keeping the bowels open with enemata and drastic purges. The abstraction of blood, more particularly general and copious venæsection, are not advisable in tetanus, as it increases the exaltation of the reflex functions and accelerates the collapse. In the case of a successful issue, we must protect the patient for a length of time from cold or mental emotions. A patient, who was under the care of Mr. Aston Key[2] and had recovered, died suddenly from the shock of a powerful emotion.

---

[1] Curling; loc. cit., p. 152.

[2] Loc. cit., p. 318.

[3] Mémoire sur la Fracture de l'Extrémité inférieure du Péroné, in Annuaire des Hôpitaux.

[4] Curling; p. 201.

[5] See a Treatise by De Ricci on the Treatment of Tetanus, in Dublin Quarterly Journal, August, 1850.

[6] Zeitschrift für rationelle Medicin, vi, 1.

In the treatment of hysteria we have dwelt upon the importance of directing our attention to the mind of the patient.

---

[1] Deutsche Klinik, 1849, p. 74.

[2] Travers; loc. cit., p. 302.

It is a question whether we are also able to avail ourselves therapeutically of the opposition of the cerebral to the reflex impulse. The following case, reported by Cruveilhier,[1] an observer who is too conscientious that we could doubt the facts, would seem to favour the assumption that it is possible. A young, man, aged 20, in consequence of a contusion of the thumb, was attacked with tetanus, accompanied by spasmodic convulsions of the respiratory muscles, and especially of the diaphragm. All remedies failed, and on the tenth day the danger was imminent, when it struck Cruveilhier that he might oppose a voluntary to the involuntary contraction of the muscles. Assuming that the muscle could not obey two stimuli at the same time, and that the more powerful would obtain the mastery over the weaker, he advised the patient to make deep inhalations in rapid rhythmical order; and in order to facilitate these movements, he indicated the time by alternately elevating and lowering his arm. The result exceeded all expectation;[2] the convulsive jerks of the muscles of the trunk and the muscles of respiration, which previously had recurred every minute, did not return for half an hour, when the patient, entirely exhausted, had ceased from his rhythmical inhalations. The experiment was repeated with the same effect. At last the patient went to sleep and slept for two hours. On the following day the improvement was very marked; the convulsive movements only recurred at long intervals, and disappeared as soon as the patient had recourse to the rhythmical inhalations. This also occurred on the following days, and on the 26th the recovery was complete.

---

[1] Observation sur le Traitement du Tétanus traumatique, in Révue Médic. Franç. et Etrang., 1834, vol. ii, p. 83.

[2] See vol. I, p. 365.

CHAPTER XXV.

SPASMS FROM INCREASED REFLEX EXCITABILITY.

TETANUS (TRISMUS) NEONATORUM.

The usual precursors of this affection are: screaming during sleep, starting, distortion of the mouth, tension and hardness of the abdomen, a leaden ashy ring encircling the lips,[1] a sharp, peculiar cry, during which the child throws its limbs about violently, bores backwards with its head, seizes the nipple violently, pushes it away as suddenly, and again screams.[2] The commencement of the disease is characterised by increased reflex excitability, by convulsive paroxysms, and a persistent tension of single groups of muscles. Among these, the muscles of mastication are first attacked; they maintain the lower jaw in an immovable position, separated from the upper jaw by an interval of a few lines, and slightly advanced. The histrionic muscles of the face are more frequently affected than they are in the tetanus of adults; the skin of the forehead forms single large transverse folds, which extend to the temples, the eyelids are closed spasmodically, the mouth points, and is surrounded by radiating folds.

The spasm also extends to the cervical and dorsal muscles, and the head is generally drawn backwards. The reflex tension is so great that every stimulus gives rise to twitchings. Hillary already pointed out that the spasms are suddenly induced at times, by merely feeling the pulse or touching the dress of the child. In a case recently brought under my notice, the most violent spasms were induced as soon as I touched the navel. A bright light, loud noise, attempts at deglutition after the milk has been introduced into the mouth by spoon, are followed by the same effects. But even independently of all external influences, convulsive agitation may ensue; suffocation threatens, the complexion becomes blue, and the extremities stiff. These attacks alternate with intervals of rest, during which the child is quiet, generally lying on one side, the face presenting a yellow tinge, the pulse becoming calmer, and beating 108 to 115 times in a minute. The evacuations and the urine are scanty, and at times entirely arrested. As the disease advances, the collapse is rendered more and more apparent, the face shrivels up, the entire body becomes rapidly emaciated, sudamina appear on the neck and chest, the temperature falls, the beats of the heart and pulse become irregular, the twitchings more frequent, and death ensues during a paroxysm, or during a state of extreme exhaustion, quietly, imperceptibly, even after the trismus has ceased.

---

[1] J. P. Frank; Interpret. Clinic.: de Trismo infantum Tergesti Endemico, p. 372.

[2] Finckh; über den sporadischen Krampf der Neugeborenen, mit einer Vorrede von Elsässer; Stuttgart, 1835, p. 6.

The disease has an acute type; it generally lasts from two to four days, but its duration is at times limited to from eight to twenty-four hours, and occasionally, though rarely, it extends to five and nine days. A case of thirty-one days' duration, with a fatal issue, observed by Elsässer, in a boy of nine years old, must be looked upon as exceptional. When of very short duration, the spasm is often limited to the maxillary muscles, and does not extend further.

Complications with other diseases are rare; the statements formerly made with regard to the connection with icterus neonatorum were erroneous, and were owing to a misconception of the normal changes in the complexion of new-born infants. In twenty-five cases, Elsässer only twice saw trismus complicated with aphthæ, and twice with blepharophthalmia; the latter suddenly disappearing after the trismus showed itself. Dr. Schöller has several times found it complicated with icterus, with blepharophthalmia, and once with stomatitis exudativa.

Elsässer and Finckh have found that the rigidity of the features continues after death, that the muscles present a woody stiffness and a sharply-defined outline; the arms and feet being drawn up to the trunk, and the fingers and toes bent in an extreme degree. These authors were the first to examine the central nervous organs, the brain and spinal cord, in this disease. In sixteen out of twenty cases, an effusion of partly fluid and partly coagulated dark red blood was found in the cellular interspace between the ligamentous lining of the spinal canal and the dura mater; this was most marked on the posterior surface, although the subjects had been kept lying on their bellies. The meninges were normal, excepting some vascular congestion in some instances. The spinal cord itself was healthy, as far as could be determined by its colour, texture, and consistency. In the cranial cavity there was congestion of the membranes, sinuses, and cloroid plexuses; and in eight cases, extravasation of blood, both on the surface, and of the cerebrum and the cerebellum. Without expressing any doubt as to the correctness of these reports, it is necessary for the due appreciation of the facts, to remind the reader of the considerable amount of congestion existing during the first years of life, both in the osseous and membranous investments of the brain and spinal cord; this will necessarily be increased by convulsive, and more especially by suffocative attacks. A short time ago I found, in a child of six days, which had died of tetanus, such intense congestion, affecting more particularly the veins and sinuses, that a slight touch and the removal of the cranial bones sufficed to produce extravasations of the partly coagulated and partly fluid blood. Dr. Schöller has met with sanguineous extravasation in the spinal cord in only one case out of eighteen. More importance is to be attached to the post-mortem appearance to which Dr. Schöller[1] has very recently directed attention, viz., the inflammation of the umbilical arteries. I am enabled, by the kindness of this physician, to make the following extracts from an unpublished treatise on the subject; "Of 18 children who died of trismus and were examined after death, this inflammation was met with in 15. The umbilical arteries were found swollen at the point where they approach the urinary bladder. The tumour was the shape of an olive, and in one instance was half a line long and four lines thick; whereas, in the normal condition, the umbilical arteries are scarcely a line in diameter. The external surface of the arteries appeared injected and reddened. On opening them, undeniable pus was found within the vessel, to a greater or less extent. The lining membrane was eroded, or covered with an albuminous exudation. Both arteries were not always equally inflamed; in three cases, one only was affected. It was a source of considerable interest to me, to meet with this condition, which the observations of Dr. Levi,[1] of Copenhagen, have also confirmed, in the case which I have mentioned above. It occurred in a boy, born easily of a healthy mother, and affected twenty-nine hours after birth with blepharophthalmia. On the fourth day, the remainder of the umbilical cord was detached; towards evening, the child became restless, and ceased to take the breast; trismus made its appearance in the course of the night. On the fifth day, I found all the characteristic symptoms of the disease. The convulsive paroxysms followed each other rapidly during the ensuing evening and night, and the morning after the child died. Twenty-eight hours later, on the 27th of October, 1841, the cadaveric section was made, by the master hand of Professor Schlemm, in the presence of Dr. Schöller and several other physicians. The navel was uninjured. The umbilical arteries were reddened and swollen in the vicinity of the navel; the right contained more pus than the left; the lining membrane was covered with a reddish exudation. There was considerable sanguineous congestion in the brain and spinal cord. In all new-born infants who had died of other complaints, Dr. Schöller has failed to discover, by the most minute examination, any inflammation of the umbilical arteries; a few times, however, he met with a yellow serous exudation in the subperitoneal cellular tissue adjoining the vessels. Colles[2] had previously, in numerous post-mortems, met with inflammation of the peritoneum in the vicinity of the umbilical vein and artery; and also coagulable lymph within the arteries, and thickening of their coats; but it was afterwards disputed by Labatt[3] and Thomson,[4] that these appearances were characteristic of trismus neonatorum. In a few cases, inflammation of the umbilical and in the hepatic veins; in a few others, inflammation of the anterior surface of the peritoneum has been met with. Schneemann, in nineteen cases, found the liver of a dark black colour and hard; in eight, there were minute points of suppuration, twice abscesses, and once pus throughout the course of the umbilical vein.[1]

---

[1] Neue Zeitschrift für Geburtskunde, herausgegeben von Busch, d'Outrepont, und Ritgen, vol. v, p. 377.

---

[1] Zeitschrift für Geburtskunde, von Busch, &c., vol. vii.

[2] Dublin Hospital Reports, vol. i, p. 285.

[3] Edin. Med. and Surg. Journal, vol. xv, p. 216.

[4] Ibid., vol. xviii, p. 41.

Causes.—Dr. Schöller has found that boys are more frequently affected than girls; out of nineteen cases, fourteen occurred in boys, and four in girls. Other writers have not found the same difference to prevail. In most instances the health of the mother was satisfactory, and the delivery was easy. The infants are almost always mature and well formed children. Sometimes several children are attacked successively in the same family. The disease makes its appearance between the fifth and ninth days. In the 200 cases which came under the notice of Riecke, in Stuttgart, in the course of forty-two years, it has never been found to appear before the fifth, rarely after the ninth, and never after the eleventh day.[2] The period at which the remains of the umbilical cord come away is that at which trismus generally commences. According to Finckh's observation, the navel, in ten out of twenty-five cases, was found dry and cicatrised, in the remainder it was either wet or swollen, with a bluish-red, inflamed edge at the margin of the navel, the cuplike depression in the middle being covered with a dirty viscid pus. In all cases in which the navel was not completely healed, it assumed a peculiar discoloured appearance on the eruption or during the continuance of the disease. Colles also found that it was superficially ulcerated, and that a soft yellow substance was deposited in the middle of the umbilicus. But in reference to these points, we must be as careful how we draw conclusions as in reference to the congestion of the brain and spinal cord; as Billard[3] has shown that in more than one third of all new-born infants the cord is inflamed and suppurates before it falls off, whilst Dr. Schöller has found the navel itself uninjured in all his cases of trismus; and in one child, who had an umbilical ulcer of eight lines in diameter, neither trismus nor other convulsions occurred. Some authors[4] have attributed the greater frequency of trismus neonatorum in negro children, in the West Indies, to maltreatment of the umbilical cord, without taking the influence of climate into consideration. Other lesions that have been

---

[1] Holscher's Annalen, 1840, vol. v, p. 484.

[2] Finckh; loc. cit., p. 7.

[3] Traité des Maladies des Enfans nouveaunés, et à la Mamelle; Paris, 1828, p. 25.

[4] See Curling on Tetanus, p. 215.

more remarkable occurrence; at a hamlet in the island of Cayenne, surrounded by mountains and dense forests, trismus was at one time only known to attack about one in every twelve or fifteen children; after a great part of the forest had been cut down, so as to allow access to the cold sea winds, almost all the new-born infants fell victims to trismus. In catholic countries, where baptism is performed during the first days of life, it is not improbable that the occurrence of the disease is favoured by carrying the infants to distant churches, especially if the weather happen to be rough and unpleasant. Würtemberg[1] district surgeons report that trismus prevails most in those parishes which are much scattered, so that the children have to be carried, in hot weather or cold, a considerable distance to the parish church. Impure air in the bedroom, and especially in lying-in wards, may produce it. Clarke[2] reports that up to the year 1782, of 17,600 children born in the Dublin Lying-in Hospital, 2944 had died of trismus. After he had introduced a better system of ventilation, only 419 out of 8033 children succumbed to the disease. It is doubtful whether, as some assume, emotional affections of the nursing mother or wetnurse may favour the development of the disease. Werlhof[3] found that three children of a mother, who nursed them herself, were carried off by trismus on the ninth day; the fourth child was made over to a wetnurse for several weeks, then restored to the mother, and remained healthy.

If we again glance at the above-mentioned causes, we cannot refuse to look upon tetanus neonatorum as one of traumatic origin. With very few exceptions it occurred after the remains of the cord have come away; most frequently about the fifth or sixth day, about the time when, according to Billard's[4] investigations, another process, that of exfoliation of the epidermis, is at its height. These two circumstances, induce in every new-born infant, a predisposition to tetanus; the inflammation of the umbilical arteries, which has recently been discovered, and the irritation of the umbilical nerves which is thus set up, necessarily promote its outbreak.[1] It is probable that, in traumatic tetanus, all causes remain inoperative, until the inflammatory irritation is propagated up to the spinal cord; in the same way every predisposition may exist in the new-born infant without giving rise to trismus, until inflammation of the umbilical vessels is set up; this may account for the rarity of the disease in spite of the prevalence of the causes.

---

[1] Curling; loc. cit., p. 212.

[2] Finckh; loc. cit., p. 29.

[3] Problema de tenellorum convulsione maxillæ inferioris, in Commerc., Noric. 1734, hebd. vi, p. 42.

[4] Loc. cit., p. 36

Trismus of new-born infants is the most absolutely fatal of all children's diseases. Cases in which a cure has been effected must be received with great suspicion, unless the diagnosis be verified by very accurate details. The safest proceeding consists in warding off the disease by attending to the proper treatment of the navel, and by avoiding injurious influences. Hancock remarks, that the West Indian midwives, to prevent the occurrence of trismus, compress the end of the umbilical cord for a couple of minutes between their fingers, and then apply a red hot iron or glowing ember to it. The same writer states, that he found repeated immersion of the newborn infant in cold water to produce a beneficial result. Future observations must determine whether the abstraction of blood in the vicinity of the umbilicus is able to prevent the occurrence of trismus, or whether it is of any service after it has become developed. Hitherto all remedies have failed after the disease is fairly established. The local abstraction of blood from the head appears, by the statistics of the Stuttgart lying-in charity, to have accelerated the progress of the disease, while musk very remarkably protracted its course to the seventh and even to the ninth day. Lukewarm baths for a time relieved the spasmodic attacks, and facilitated the deglutition of the mother's milk that was dropped into the mouth. Dr. Rieke[2] succeeded in saving a new-born child that was attacked by tetanus, by giving him every hour a drop of the tincture of opium. About half a drachm was thus given to the child; after which, a drop was given it two or three hours during one day, until all the symptoms had vanished. A similar case, with an equally successful result, from the external and internal administration of laudanum, has been communicated in the 'Edinburgh Medical and Surgical Journal' by Dr. Furlonge.[1]

---

[1] A full exposition of this matter is given in: Die Controverse über die Nerven des Nabelstranges und seiner Gefässe einer sorgfältigen Prüfung unterworfen, von Schott; Frankfurt, 1836, p. 36, seqq.

[2] Finckh; loc. cit., p. 52.

TETANIC affections, produced by irritation of peripheral nerves passing through organs and cavities, have not hitherto been made a subject of careful investigation. Observers have chiefly directed their attention to the traumatic irritation of cutaneous nerves, without reflecting that every irritated sensory fibre is capable of increasing the reflex sensibility of the spinal cord by centripetal action. Curling[2] quotes from Ploucquet's 'Literatura Medica Digesta' a few cases, in one of which the origin of tetanus was attributed to an ossified point in the pleura irritating the splanchnic nerve; in the other, to the sharp angle of an ossified gland in the vicinity of the trachea, which was said to have exerted the same influence upon the vagus. The following observation, by Dr. Bright,[3] is more detailed. The patient was attacked by pain in the right thorax, and by rheumatic tumefaction of several joints, in consequence of exposure to cold. On the fifth day of her illness she sought for medical advice. In spite of repeated venesections, the pleuritic pain and the dyspnœa increased; the pulse was much accelerated and irregular, and towards evening dysphagia supervened. The patient had great difficulty in opening her mouth. Excepting a wound received six months previously above the left eyebrow, which was perfectly healed at the time she came under observation, there was no external injury to which the symptoms were referable. Deglutition could only be effected with extreme difficulty, and it induced convulsions. The action of the heart was very quick and spasmodic, but there was no friction or other morbid sound. The trismus increased during night, and on the following morning the teeth were firmly clenched. The patient was unable to swallow her saliva. The face was expressive of extreme anxiety, the cervical and dorsal muscles were attacked with spasm. Pleuritic effusion was discovered at the inferior portion of the left lung, by the existence of a friction sound. In the course of the day, universal convulsions occurred repeatedly, and twenty hours after the outbreak of the trismus, death ensued. P.M.—The lungs were found gorged with blood, but permeable, with the exception of a small portion of the right lung in the vicinity of the diaphragm, and a yet smaller portion of the lower lobe of the left lung. The lower half of the right pleura, where it is reflected from the ribs to the diaphragm, was intensely inflamed, and covered with a thin layer of fibrine. The inflammation was yet more marked where the right pleura adjoined the right side of the pericardium. The phrenic nerve took its course through this nidus of inflammation, and upon the diaphragm it was covered with fresh flakes of exudation. The left pleura was also inflamed, and an abscess was found at its lower portion, in the vicinity of the diaphragm. The cavities of the cranium and spinal cord were not examined. Allied to this fact are the observations noted by Swan,[1] of the congested and inflamed condition of the semilunar and thoracic ganglia in tetanic patients; similar observations have been made by Aronssohn, and in horses the same condition has been remarked by Dupuy.

---

[1] 1830, p. 57.

[2] Loc. cit., p. 66.

[3] Cases of Spasmodic Disease accompanying Affections of the Pericardium, in Med.-Chir. Trans.; London, 1839, vol. xxii, p. 5.

Tetanus may also originate as a primary affection of the central spinal apparatus, without irritation of the peripheral tracts; this is termed the idiopathic form; it presents itself in two varieties, as the rheumatic and toxic.

1. *Rheumatic tetanus* occurs more frequently in the tropics than in our latitudes, and is more common among the dark than the white races; it is brought on by sudden changes of heat and cold, and especially from the heat of the day to the cold of night; it results less frequently from emotions. Its symptoms do not differ from those of traumatic tetanus, but Thomson[2] considers it to be less acute. The danger is equally great, the treatment generally avails nothing, though a few

---

[1] A Treatise on Diseases and Injuries of the Nerves; London, 1834, p. 334, and seqq.

[2] Remarks on Tropical Diseases, in Edin. Med. and Surg. Journal, vol. xviii, p. 40.

cases are recorded of successful treatment with diaphoretics, camphor, ammonia, and vapour baths.[1] The disease has been repeatedly confounded with inflammatory states of the spinal cord, which accounts for the praise bestowed upon antiphlogistic treatment. The diagnostic criteria consist in symptoms of exalted reflex action; it is from the absence of the latter that I was induced to consider the following case as one of myelitis, notwithstanding the presence of several tetanic symptoms.

A healthy man, 66 years of age, was attacked in the night, from the 19th to 20th of April, 1827, by a painful tension of the lower jaw, and a difficulty of opening his mouth. This increased on the 20th; the belly became hard and tense; the cervical muscles were rendered rigid, and the patient lay immovably on his back. I was called in on the 21st. I found the masseter and temporal muscles tense and hard; the jaws compressed, but still capable of being slightly separated by a powerful effort of the will. The cervical muscles were rigidly contracted, and the head was slightly bent backwards; the patient was incapable of raising himself or turning round, and when an evolution was accomplished, with the assistance of those about him, he screamed for pain. The superior and inferior extremities were easily moveable in all directions, and their muscles, especially the gastrocnemii, were flabby, while the abdominal muscles felt like a board. The temperature was elevated; the pulse full, strong, and making 112 beats; breathing was impeded; the bowels constipated, and the urinary secretion normal. The most minute examination neither showed an injury, nor was there any positive proof of a catarrhal affection. A copious venæsection and calomel and opium, gr. jss every two hours, were ordered. Attempts at movement or deglutition did not induce convulsions, nor was there any other evidence of exalted reflex excitability. The dyspnœa increased; consciousness remained unimpaired, and on the 22d of the same month, death ensued. At midday, on the 23d, the thermometer being at 13° 3′ R. (62° F.) the cadaveric inspection was made. Very little fluid was found in the cranial cavities; there was more at the base of the brain, and this was of a reddish colour. The density of the medulla oblongata presented a marked contrast to the great softening of the cervical portion of the cord, which exuded from its membranes on slight pressure. The dorsal portion was firm; the lumbar portion, again, almost liquid.

---

[1] See Dr. Henoch's Beiträge zur Pathologie des Tetanus Traumaticus, in—Caspar's Wochenschrift, &c., 1843, No. 50.

2. *Toxic Tetanus* is produced by poisoning with strychnine and brucine, which are contained in different plants in varying proportions; strychnine is chiefly found in the strychnos nux vomica, the strychnos sancti Ignatii (which contains the largest amount of strychnine), the strychnos colubrina, and the strychnos tieuté, in which it is associated with only a small quantity of brucine;[1] brucine is found in the spurious angustura bark.[2] Strychnine exerts its tetanic influence upon all classes of animals, and, acccording to a verbal communication from the celebrated Professor Ehrenberg, even infusoria are not exempt from its control; he states that infusory animalcules are peculiarly adapted for examination, when rigidly extended by contact with a watery solution of strychnine. In a physiological point of view, the recent experiments of Dr. Stilling are very interesting; they shew that when strychnine is applied directly to the spinal cord, the functions of this organ are so changed that the nerves derived from it induce tetanic movements in the corresponding muscles. Dr. Stilling[3] removed the entire viscera, heart, lungs, stomach and intestines, from a considerable number of frogs, after which operation the nervous system still continues to perform its functions for a short time, from half an hour to an hour; he then exposed the brain and spinal cord, by removing the arches of the vertebræ and the cranium, and applied to some part of the spinal cord a single drop of a solution of acetate of strychnine. About five minutes later all the frogs thus treated, without exception, were seized with tetanus, as violent and universal as it is ever seen in the sound animal. A slight touch of one hind toe reproduced an equally general attack of tetanus, and a renewal was also induced by touching a toe of the anterior extremity, exactly as in entire frogs that have been poisoned by strychnine. Strychnine applied to any point of the spinal cord, ope-

---

[1] Pelletier and Caventou, in—Annales de Chimie et Physique, xxvi, p. 56.

[2] Christison, On Poisons; Edin., 1836, p. 806.

[3] Untersuchungen über die Functionen des Rückenmarks und der Nerven; Leipzig, 1842, p. 40.

rates upon the entire spinal cord and brain, provided these organs have preserved their connection with the part moistened with the poison. There can be no doubt that this is the result simply of imbibition. Even when small doses of strychnine are given therapeutically, we may observe an exaltation of the reflex function. Dr. Köhler[1] remarks, in his report on the Berlin Hospital la Charité for 1833, that some individuals who took strychnine became so sensitive to external impressions that even when merely touched with a finger they at once broke out into an uncontrollable laughter. When poisoning is induced by larger doses, it is followed, after an interval of from five, ten, thirty minutes, by paroxysms of tetanus in their most violent and rapid form. Professor Emmert,[2] who has deserved so well of physiological toxicology, reports a fatal case of tetanus brought on by the employment of a decoction of the spurious angustura bark. After taking the third tablespoonful the patient, a boy of five years, complained to his mother that his arm trembled, and asked her why he was obliged to shake so. The tremor soon passed into violent convulsions. When Dr. Emmert touched his arm, in order to feel his pulse, a sudden and violent tetanic spasm supervened; the eyelids opened wide; the eyes projected rigidly and immovably; the lower jaw was firmly compressed against the upper one; both lips separated from one another so that the front teeth were exposed; the different muscles of the face were tense; the extremities were violently extended and rigid, and the spinal column and the head were violently drawn back. The trunk, and especially its inferior portion, was from time to time agitated by violent twitchings, like electric shocks passed along the spinal column; the body was raised; the respiration intermitted; and lips and cheeks assumed a livid hue. After the paroxysm, which lasted about half a minute, the patient respired with great difficulty with distended nostrils, which diminished after a time, but was not entirely lost, as little as the bluish colour of the otherwise red portions of the face. He repeatedly and positively denied that he suffered any pain. Every attempt at drinking instantly induced the spasm. Thus the patient had suffered five attacks, partly without an exciting cause, partly owing to a noise, partly because some part of the body was touched; in the intervals he would therefore not allow anybody to touch him, and he implored anybody who happened to approach him, not to touch him. After a renewed attempt at drinking, the last violent paroxysm supervened, which lasted a minute; on its termination the body became relaxed and flabby, and only a few more weak respiratory convulsive movements occurred at long intervals. Life had fled sixty-five minutes after the commencement of the attack. Christison[1] has recorded similar cases of poisoning with strychnine. Stark[2] relates a case of poisoning by strychnia in a man, who, in addition to the most violent spontaneous spasms, every now and then suffered from opisthotonus and thoracic spasm; the gentlest touch of any part of the body, even through the clothes, as well as the slightest current of air, caused by opening the door, or by a person walking through the room, excited a spasmodic jerking agitation of the entire body, resembling the shock of a Leyden-flask.

---

[1] Jahresbericht über das Charité Krankenhaus zu Berlin, vom Jahr 1833, in Rust's Magazin für die gesammte Heilkunde, vol. xxvi, p. 48.

[2] Ueber die giftige Wirkung der unächten Angustura, in Hufeland's Journal für Practische Heilkunde, vol. xli, p. 73.

Death ensues, as in traumatic tetanus, during a convulsive attack, from asphyxia, or from extreme prostration; according to Segalas, even the irritability of the heart is entirely exhausted, so that in animals no further contractions are produced by stimuli, and life cannot be supported by artificial respiration.[3] The more rapidly death supervenes the less marked are the post-mortem appearances. In Emmert's case, and in another reported by Ollier, nothing of any consequence was found. The stomach and intestines have been occasionally found inflamed. Orfila and Ollivier[4] once met with serous effusion on the surface of the cerebellum, and softening of the entire cortical substance of the brain, and especially of the cerebellum. We know but little of the treatment; if called in immediately after the accident, we may expect to derive some benefit from evacuating the stomach by means of an emetic or the stomach pump. Donné states that iodine, bromine, and chlorine, are sure antidotes to strychnia, but only if taken within ten minutes of the poisoning. A grain of strychnia proved innocuous to animals, if followed up by tincture of iodine; two grains and a half of the iodide of strychnine produced no injurious effect.[1] We should, at all events, try inhalations with chloroform. The experiments made by Morgan[2] on the antidotal power of the poisons with which the Americans tip their arrows, to the East Indian poison, are extremely ingenious; the former is the ticunas or woorara poison, which possesses the opposite property to that of strychnia, as it caused instant paralysis,[3] the latter is the Javanese chetik, or upas ticuté, which Pelletier and Caventou state to contain strychnine.[4] A fatal dose of the Javanese poison was given to dogs, and as soon as the first tetanic symptoms showed themselves, the woorara was inoculated with such success as to restore the animal completely; it was necessary to apply a ligature, from time to time, above the point at which the woorara had been introduced, as this, from being the more active poison, in several cases proved fatal within two minutes. The woorara showed an analogous effect in the experiments that were performed in the London Veterinary School upon horses attacked with idiopathic tetanus. One horse that was labouring under tetanus, and whose jaws were so firmly closed that neither food nor medicine could be introduced, was inoculated with the woorara on the point of a poisoned arrow in the fleshy part of its shoulder. Ten minutes after, it fell down apparently dead; artificial respiration was at once commenced, and continued for four hours. The animal arose, to all appearance perfectly restored, and devoured its food ravenously; unfortunately, too much was given it during the night his stomach was overfilled and distended, and this caused his death on the following day, though without the slightest return of the tetanus. Morgan concludes with the following observation: "I have no desire whatever to inoculate tetanic individuals with curara, but it is not beyond the bounds of possibility that one or other of the constituents of this poison may eventually prove useful in the treatment of tetanus."

---

[1] Loc. cit., p. 800.

[2] Allgemeine Pathologie oder Allgemeine Naturlehre der Krankheit, 2 Abth., p. 1216.

[3] Magendie; Journal de Physiol., vol. ii, p. 361.

[4] Archives Gén. de Méd., vol. viii, p. 18.

---

[1] Christison; loc. cit., p. 804.

[2] A Lecture on Tetanus; London, 1833, p. 32.

[3] See Emmert's Treatise, Ueber das Amerikanische Pfeilgift, in Meckel's Deutsches Archiv für Physiol., vol. iv, p. 165.

[4] Annales de Chimie, &c., vol. xxvi, p. 44.

CHAPTER XXVI.

SPASMS FROM INCREASED REFLEX EXCITABILITY.

HYDROPHOBIA.

THE tetanic affections we have hitherto considered have shown us the reflex functions of the spinal cord in an exalted state, and we know that similar phenomena are capable of being produced in decapitated animals; we now turn to the consideration of a morbid condition belonging to the same class, the symptoms of which refer mainly to the medulla oblongata, as they manifest themselves in the functions of respiration and deglutition. It is the disease known under the name of hydrophobia, a toxoneurosis occurring in man after the communication of the poison of rabies.

A painful sensation in the bitten wound, which has already cicatrised, precedes the outbreak of the disease; the sensation passing towards the spinal cord; there is rarely a feeling of numbness, and still less frequently reddening and swelling of the cicatrix. Horripilations, terror, ill temper, disturbed sleep, headache, and febricitations, present themselves as precursors. But even without these forerunners, the individual may, on attempting to drink, be seized with a peculiar difficulty of swallowing, which consists less in an incapability of swallowing, than in an impediment presented to this function, by a difficulty of breathing; the patients uniformly describe their sensation as one of strangulation and suffocation, when they swallow, accompanied by great anxiety, which is increased at every repetition of the experiment. Sobbing inspiration precede, the shoulders are elevated, and the epigastrium is tumid, as in an attack of asthma. From the commencement, there is an excess of reflex tension, and convulsive agitation results from the most trifling irritation. The most extreme sensibility is manifested to the most indispensable vital stimuli, air and water; and which henceforth seem only to exert a hostile influence. Not only a current of air, produced by fanning, raising the bed-clothes, opening a door or window, but slighter oscillations of the atmosphere, by movements of other persons or animals, imperceptible to the healthy individual, are capable of exciting respiratory spasms and universal convulsions. The respiratory movements themselves may be converted into sources of reflex irritation. Youatt[1] observes, that strong inspirations, without seeing or touching water, give rise to spasmodic attacks; and Bright[2] expressly states of one of his patients, that he carefully avoided taking a full inspiration. On the other hand, we find that the contact of the lips and the cavity of the mouth with a fluid, and especially with water, at once excites respiratory spasm and spasmodic dysphagia; accompanied by starting of the whole body, twitchings of the face, and of the arm and hand that conveys the vessel to the mouth; the movements of deglutition, like respiratory efforts, act as irritants, and attempts to swallow the saliva or solid substances produce the same effect. Water and air of a low temperature are still more liable to produce it. But even without any external irritation, attacks of anxiety and strangulation supervene from time to time. The reflex excitability of the entire surface is coincidently exalted, so that unexpected contact,—touching the thigh with the edge of the chamber utensil, the falling of a few drops of urine upon the limb, sprinkling the skin with a few drops of water,—cause a shudder and gasping for breath, such as we see in a person who for the first time jumps into a cold bath, or has a pail of water poured over him. The relation of the psychical functions of the patient to the state of the reflex action is characteristic. The impressions excited by the respiratory spasm accompanying the first failures in the attempts at deglutition, are so vivid, that in spite of the raging thirst, the patient will not repeat the attempt, or only does it with extreme repugnance; everything that awakens the remembrance, whether an object presented to the mind or to the senses, induces a spasm of the respiratory muscles, or the muscles of deglutition. This applies equally to the contact of a current of air. The hurry and excitement with which voluntary movements are executed is most peculiar. The muscles, as Parry[3] appropriately remarks, appear to anticipate the determination of making a movement. The sudden starting up, the rapid leap out of bed, the extreme haste in walking, the violent seizure of a vessel, the wild gesticulations, and the excessive jactitation, prove the truth of the observation. It is also undeniable that the mind is excited, and it manifests itself by the loud and violent manner in which the patient speaks. The patient is disturbed by a fear of approaching danger; sleep is totally absent, or, if it visits the sufferer, it is interrupted by frightful dreams or spasmodic movements, resembling attempts at drinking. Inexpressible anxiety is depicted in the eyes and face, as the internal unceasing restlessness is mirrored in the gesticulations and movements. The patient complains of a burning pain in the thorax and at the pit of the stomach; the frequency of the pulse and the respiratory movements are excessively augmented, while the temperature and turgor of the skin is diminished; the secretions of the kidneys and intestinal canal are scanty, while the salivary secretion is increased, causing an accumulation of thick, vivid, frothy saliva in the mouth, and at the angles of the lips, which the patient makes vehement efforts to spit out. Vomiting frequently supervenes; priapism and satyriasis also occur, but less frequently. The restlessness reaches the highest pitch; to the spasms of deglutition and respiration, trismus and opisthotonus may be superadded; the excitement increases to mania; delirious dreams picture to the sufferer dangers, against which he combats with all his might; yet his attention is easily arrested by questions directed to him by the bystanders; he is restored to himself, and shows his consciousness to be undisturbed. The force of the disease is augmented from hour to hour. Death ensues from apoplexy or asphyxia, during a violent paroxysm of convulsions, or it may be from extreme exhaustion, quietly, even under the false semblance of incipient recovery, after the capability to drink had returned.

---

[1] On Canine Madness; London, 1830, p. 10.

[2] Reports of Medical Cases, vol. ii, p. 583.

[3] Cases of Tetanus and Rabies Contagiosa; London, 1814, p. 77.

These features of hydrophobia are subject to modifications by age, sex, idiosyncracy, and treatment. In childhood, the ignorance of the consequences of the injury and the danger to life, allows an *insouciance* which contrasts strongly with the despairing frame of mind of adults; while it leaves the morbid condition more uncontrolled. In these cases mania is rarely met with; in the female sex, the psychical reaction is manithe other portion of the nerve, and it remains doubtful whether it was not rather to be imputed to the scarification and other irritant treatment employed than to the bite. Traces of inflammation in the vagus and other nerves, to which Autenrieth was the first to direct attention, have not been met by other accurate observers; and Krukenberg,[1] in a well-written case, has shown that it was not neuritis but imbibition which was the cause of the red colour of the nerves, the vagus, phrenic, and sympathetic. Recently, however, Froriep[2] has described the vagus, glosso-pharyngeus, cervical nerves, and the two upper cervical ganglia of the sympathetic, as being perfectly sound, while the third cervical ganglion, on each side of the neck, was dark red, of increased firmness, and presenting great vascular development. On division, these ganglia showed an increased amount of blood, and a granular appearance of the cut surfaces. They were much enlarged, being equal to the kernel of a plum, and much larger than the superior ganglion. This was all that was found morbid in the sympathetic, for the superior thoracic ganglion, as well as its inferior portion, was normal. Trolliet[3] mentions that the choroid plexus of the fourth ventricle, and its prolongation in the vicinity of the point of insertion of the vagi, are found much gorged. The majority of observers agree in testifying to the following changes in the respiratory organs: congestion, partial and general reddening of the mucous membranes, extending from the glottis to the finest bronchi, accumulation of frothy mucous fluid, engorgement of the lungs, with dark fluid blood containing many air bubbles, and lobular emphysema. Beyond the imbibition above spoken of, affecting the lining membrane and the muscular tissue, nothing of moment is found in the heart and large vessels. The cavity of the mouth is generally found to contain much viscid, whitish-yellow mucus. The papillæ of the tongue and the mucous glands of the mouth and pharynx are often much developed and prominent. Some patches of reddening and congestion of the vessels is visible at the pharynx and intestine, and especially in the stomach, the mucous membrane at these points being tumefied.

---

[1] Horn's Archiv, 1817, p. 365.

[2] See his post-mortem Account appended to an admirable history of a Case by Wolff, in Med. Zeitung, &c., 1836, p. 236.

[3] Loc. cit., p. 135.

[illegible] scanty, [illegible] The [illegible] already [illegible] and some recorded [illegible] practice, only [illegible] Horn, [illegible]

[illegible] was attacked, [illegible] which lasted [illegible] a relative, he [illegible] on a chair, [illegible] that had [illegible] at him, [illegible] the dog [illegible] on his [illegible]

[illegible] children, was [illegible] of [illegible] which the pro-[illegible] the garden [illegible] was heard of [illegible] cut off, to place [illegible] was completely healed. [illegible] perfectly healthy, except that [illegible] of his nose, which persisted [illegible] His good spirits and animation [illegible] disturbed: and it was not till the [illegible] after the injury, that he complained [illegible] finger, which the day after also [illegible] The [illegible] at the same time observed, that [illegible] his breathing was [illegible] a restless night from the 31st August to [illegible] continually, so that it was [illegible] for the brother who generally [illegible] He then slept till 6 o'clock.

[illegible]

[illegible] und von Anmerkungen [illegible]

[illegible]

[illegible] Hinsicht systematisch [illegible]

[illegible] 1813, p. [illegible]

Instead of the coffee which he usually had for breakfast, he asked his mother for water; but on seeing it he was said to have shuddered, and to have pushed it away forcibly. He was unable to swallow any other fluid or solid food; the mere sight of which was repulsive to him, for which reason he begged his parents and brothers and sisters not to dine in the same room. An emetic, which was prescribed and swallowed with considerable difficulty, only produced a slight effect. During the following night he manifested great restlessness, and constantly complained of violent thirst, and the impossibility of swallowing the beverage. On the 2d of September, pains in the entire left arm and ear supervened; a current of air produced by the mere elevation of the bed-clothes, sprinkling a few drops of urine on the skin, excited the same paroxysms as the attempts at drinking. Consciousness was unimpaired; he gave sensible answers to the questions addressed to him, and often expressed that he would willingly die if he could but first drink his fill. I saw the boy at five o'clock in the afternoon; he was lying on his back; his eyes were brilliant and rolled about, his face red, and his features expressed distressing anxiety. His tongue had a white coating; the skin was dry; the back and the extremities cool; the chest was the warmest part; the pulse full, very quick, as much as 160 beats in the minute; the impulse of the heart strong; the respiration accelerated in proportion to the pulse; the urine of a pale yellow colour; the movements were performed with energy and haste. I offered him a saucer full of beer, and challenged him to drink; the mere aspect of the saucer startled the boy, and as soon as I approached the cup to his lips, sobbing respiration, and a convulsive movement of the entire body ensued; he turned his head in the opposite direction, and rolled his eyes about wildly. The experiment was repeated three times, and each time the same phenomena recurred. When he caught sight of a glass of water, the restlessness was greater, and the shudder more violent. I now put the cup into the boy's hand and urged him to drink, telling him that he must die if he did not obey. He seized the cup with a trembling hand, and carried it to his mouth; he shuddered, and wanted to return the cup to me; but on my ordering him with a threatening voice to drink, he took courage, and in spite of the hiccup which supervened, swallowed about half a teaspoonful hastily, but with extreme difficulty. I then dipped the handle of a teaspoon into water, and for several minutes dropped the water off it upon his tongue. This trifling quantity he swallowed without much trouble or shuddering. I had a basin of water put by the bedside, and ordered the patient to wash his hands. He remained quiet on seeing this water, and washed his hands without exhibiting any change in his features or in his demeanour. The same was the case when a bright object was held before him, such as a mirror, or the polished surface of a watch; the last he evidently regarded with pleasure. On the other hand, he was very sensitive to the contact of cool air, especially if the current was strong; thus the quick airing of the bed-clothes produced effects similar to those brought on by attempts at drinking. The sound of the rain, while the window was open, produced no impression, but he showed great anxiety as soon as flies settled upon his face or hands, or upon the bed, he then called out to his father in great distress of mind to drive the flies away. The activity of the senses and his intellectual powers were unimpaired. He repeatedly denied that he suffered pain, nor did he exhibit the least sensation when pressure was applied to the thorax or the abdomen.

The features of the disease, as just now sketched, continued exactly the same during the hour and a half that I spent at the bedside of the child. The treatment consisted in taking twelve ounces of blood from the arm, scarifying and applying cantharides ointment to the cicatrix, rubbing in a scruple of mercurial ointment into the inner surface of the left arm, and giving two grains of calomel hourly. Greater calmness supervened after the venesection, during which the boy had sat on his father's lap; the movements became less hasty; he shuddered less when a glass of water was held up to him; but it was only upon the most urgent solicitation on the part of the parents, as well as of myself, that he could be induced to swallow the calomel powder. Dr. Horn visited the boy at 7 o'clock in the evening, and described his condition in the following terms: his features expressed extreme anxiety, his eyes told a tale of immeasurable misery, he tossed about constantly in bed, and could in no way obtain rest; his eyes rolled about, and in all his movements there was a certain expression of violence and force. He complained of nothing, but he started when anybody approached him, suddenly went up to him, or offered him something to drink. He objected much to taking medicine, or to the inunctions; he implored that he might not be touched nor be bled again; he desired nothing more than to be allowed perfect rest. The temperature of his skin was somewhat reduced, especially about the head, the hands, and the legs. The examination, and in fact every contact and approach, appeared to excite in him unpleasant emotions. There was not any frequent spitting. The pulse was hard, quick, and extremely frequent. It was repeatedly and accurately examined by a second hand, and found to amount to 180—190, and even 200 beats in the minute, the number of inspirations being at the same time from 45—50. He still continued able to look at and touch polished objects, such as a watch or a looking-glass, without experiencing any unpleasant sensations. He was utterly unable to drink water, tea, or beer. When the drinking vessel was brought near, he quickly averted his face, and pushed it aside with his hand. He attempted to convey a piece of soft plum tart to his mouth, but he spat it out almost before he had commenced sucking it. He put other delicacies that were offered him aside, saying that he would keep them for the morrow. The boy still exhibited strength enough in his movements, his posture, and his speech; the venesection was therefore repeated, and the dose of calomel repeated; scarcely two cupfuls of blood had been obtained, when the face and hands became markedly cooler, the pulse smaller, the voice weaker; but the expression was still brisk, the eye was bright and moveable, and the syncope that I expected did not supervene; still the changes mentioned induced me to arrest the flow of blood. The hydrophobic symptoms continued unabated, while the pulse, though much weaker, exhibited the same remarkable frequency as before. After having watched the unfortunate child for nearly an hour, I took my departure. Half an hour later death came to his relief.

The post-mortem examination was made on the 4th September, five and twenty hours after death, in the presence of the late Dr. Heim, and several medical men, by the then officer of health of Berlin, Dr. Mertzdorf.

The corpse presented a saturated yellow tinge, intermingled in the cheeks with a livid red; the upper and lower extremities were flexible and flabby; the eyes were not so faded and dull as usual; in spite of the low temperature of the atmosphere, the smell of putrefaction was already developed. The muscles presented a dark red appearance; the lungs were strongly charged with blood. The larynx, the trachea, and œsophagus presented nothing abnormal, the tissues of these parts were pale. On the other hand, the redness of the heart was remarkable, the arteries and veins on its surface looking as if they had been injected. The mitral and aortic valves presented a scarlet hue, which remained unaltered even when repeatedly sponged. The trabeculæ carneæ were darker than usual, the internal surface of the aorta was of a bright red hue as far as the arch. The blood contained in the vessels was dark and fluid. The inner surface of the stomach was as pale as that of the œsophagus. No morbid change was found in any other abdominal organ. At the urgent request of the parents the head was not examined.

Etiology.—The exciting *cause* of the disease just described is the poison of rabies, which is generated in the dog and various animals of the canine species, such as the wolf, the fox, and the jackal, and may be communicated by them to other animals, such as cats, ruminantia, horses, pigs, and also to man; the communication may be made directly or by the intervention of another animal previously infected by a dog. Whether birds or amphibious animals are capable of taking the poison is unknown. The poison itself is of a fixed and not a volatile character, and capable of being propagated so long as the corpse has not become perfectly rigid; whereas it is never communicated by cutaneous or pulmonary exhalation through the intervention of the atmosphere. The ordinary vehicle is the saliva or mucus from the mouth of rabid dogs; but Hertwig[1] has shown, in his excellent contributions to knowledge of the canine madness, that unmixed saliva, taken from the salivary duct, portions of the salivary glands laid upon a wounded surface, and, lastly, the blood itself, venous and arterial, are capable of communicating the infection. An abrasion of the skin is necessary for the development of the poisonous effects. Both the cutis and the mucous membrane must be deprived of their epithelial layer, whether the communication be made by mere contact (slaverving over excoriations) or by inoculation (bites). The effect produced by the poison depends upon the receptivity of the organism. Generally speaking the susceptibility for this poison is not very great, but it appears to be greater in dogs than in man or other animals. According to Hertwig's experiments, the proportion is somewhat above 23 per cent., hydrophobia appeared in 14 out of 59 dogs that had been inoculated. In some the contagion was effected after the first inoculation, others passed through two, three, and four inoculations, and then became infected; another resisted all inoculations that were made for three years, amounting to nine; while seven other dogs that, at different times, were inoculated with him, suffered from hydrophobia. Youatt states the proportion of poisonings after bites to be larger; he considers that two out of every three dogs who are bitten, are attacked by the disease. In horses it occurs with tolerable frequency, least frequently in sheep and in cattle. The susceptibility also appears to be slight in man: John Hunter[1] met with an instance in which 21 individuals were bitten by a mad dog; they took no precautions, yet only one was seized with hydrophobia. Vaughan and others communicate similar facts.[2] In other cases we meet with different results; thus, Trolliet gives the history of 23 persons who were bitten by a rabid wolf, 13 of whom were attacked with hydrophobia. In order to explain this difference, an importance has been attached to favorable circumstances, which is not justified by the rules of strict criticism. Thus, the bite of a mad wolf is said to be more surely poisonous than that of a dog.[3] Some writers have asserted that when hydrophobia is transferred from dogs to man, horses, or ruminants, it ceases to be communicable; they quote the experiments of Dupuy,[4] who invariably failed to inoculate oxen or sheep from animals of the same species, whereas these animals were at once seized if they were inoculated with the slaver of a mad dog.[5] This is met by a fact stated by Youatt, who saw a groom attacked with hydrophobia, in consequence of having caused an abrasion of his hand within the mouth of a mad horse, which he was physicking; we may also add that Magendie and Breschet communicated hydrophobia from a man to a dog. On the 19th July, 1813, they inoculated two dogs with the saliva of a man labouring under hydrophobia. One became mad on the 27th of July, and bit two other dogs, one of whom was attacked on the 20th August with hydrophobia.[1] This alone suffices to prove what Hertwig's experiments have yet more thoroughly demonstrated, that it is erroneous to assert that the poison loses its power by communication to a second and third subject. Some protection is afforded by the part being covered with hair, wool, or thick clothing, by which means the poison is intercepted; hence the greater danger arising from wounds of the face or hands.

---

[1] In the Supplementary Number to Hufeland's Journal, 1828.

---

[1] Parry; loc. cit., p. 84.

[2] Andry; Recherches sur la Rage, p. 189.

[3] Trolliet; loc. cit., p. 170.

[4] See the article 'Rage,' in Dictionn. des Sciences Médic., vol. xlvii, p. 46.

[5] Loc. cit., p. 22.

An interval intervenes between the introduction of the poison and the appearance of the disease; an analysis of sixty authentic observations has shown, that the shortest period is 15 days, the longest from 7 to 9 months, and that the average period is from 4 to 7 weeks. The same infection presents differences, which are independent of age or sex, or the locality of the injury. Thus we find that in the 13 patients described by Trolliet, who had been bitten in one day by a mad wolfbitch, the hydrophobia made its appearance—

In six between the 15th and 30th day.
four „ 30th „ 40th „
two „ 40th „ 53d „
And in one, 3 months and 18 days after the bite.

Hertwig has found that in dogs the outbreak of the disease occurs within 50 days, whether the poisoning is effected by a bite or by inoculation.

All that we know of the interval, or as it has been termed, the period of infection, is what relates to its duration; the statements that have been made respecting phenomena, said to prove the occurrence of infection, are entirely untrustworthy and false. It has been asserted, that the bitten part assumes a peculiar appearance, that a tumefaction occurs around the bite, that vesicles and pustules are formed in the immediate vicinity of, and also at a distance from the wound,[1] under the tongue in the ducts of the submaxillary glands, between the third and ninth days after the injury; these so called hydrophobia vesicles have turned out to be a hoax practised by a peasant of the Ukraine. There is, however, a negative symptom, which, if confirmed by future observers, may be deserving of attention; it is the absence of an inflammatory swelling of neighbouring lymphatic glands and vessels occurring after the lesion, or after inoculation in animals.

---

[1] Trolliet; loc. cit., p. 172.

It appears that accidental circumstances favour the development of the disease, after the poison has been received into the economy; bodily exertion, mental emotions, and especially fear, and external injuries, may act in this way, as we see in those cases in which the hydrophobia makes its appearance after the lapse of a longer interval than usual. In one of the patients, whose history is recorded by Trolliet, three months and a half had passed since the bite; he had been leading a very quiet life up to that time, but being seduced into the commission of excesses, he was returning from a fair one day, when he met a dog who suddenly attacked his horse; all the details of his own former accident recurred to his mind, a few days after the hydrophobia made its appearance, and carried him off on the third day. Lenhossek quotes two instances from older writers, (which, however, do not offer the guarantee of accurate and detailed delineation,) in which the hydrophobia was excited respectively six and nine months after the bite had been inflicted; in one owing to a kick, in the other, to a block of wood thrown at the cicatrix of the bite. Youatt observes, that also in animals the slumbering germ may be brought to life by excitement. The disease does not make its appearance in pregnant bitches until two or three days after they have littered; it is common to find it occurring while dogs are in heat.

Comparative pathology.—Our diagnosis of hydrophobia is confirmed by ascertaining the existence of rabies in the animal which has inflicted the injury. The present is the proper place to introduce these diagnostic experiences, although a separate chapter at the end of the work will be devoted to the consideration of the results afforded by comparative pathology, which are peculiarly important in relation to nervous diseases. So many errors had crept in, even into the nosology of canine rabies, and had been maintained by tradition, that great thanks are due to the distinguished veterinary surgeons by whose efforts the fallacies have been exposed. With us Germans, Hertwig, among the English, Meynell and Youatt, deserve especial mention, as observers who have shown the marked difference in the phenomena of the disease, as it affects the human or canine species. In the latter, Hertwig states the precursory symptoms to be either entirely absent, or not to be characterised by any peculiarity; Youatt has observed that the animal is in the constant habit of licking and scratching the wounded and cicatrised part, and that it will continue doing so with extreme violence, until the parts are perfectly lacerated. When hydrophobia has made its actual appearance, it assumes, according to Hertwig, either the form of wild or of still rabies. The former is marked by psychical excitement, the tendency to bite and to run, while depression and paralytic debility, especially of the lower jaw, obtain in the latter. The pathognomonic symptoms are particularly dwelt upon. 1. A peculiar alteration of the voice, and in the bark. The voice is rough, hoarse, and anxious. The bark does not consist of a rapid succession of separate sounds, but the first sound always passes into a short howl; so that the whole is neither a regular bark nor a howl, but something between the two; while uttering it the animal generally raises its head. Some are constantly emitting these sounds, without any cause, and for several days continuously, while others only do so rarely, and upon a given cause. 2. Youatt states, that respiration is always much affected; breathing is much impeded, and inspiration is accompanied by a rattle. 3. Psychical disturbances are manifested by change of behaviour and habits; and vary according to the race, the temperament, and the mode of living of the dog. Generally speaking, we find an internal anxiety manifested by restless running about, constant sidling over to the door, change of place, escaping from the house and wandering about in the streets, or in the fields; it shows itself in a tendency to bite and fly at other animals; in wild, savage dogs, this amounts to a mania for killing and destroying, which they exhibit towards living animals, and especially cats, as also to inanimate objects. When they bite other dogs, they generally select the mouth, or the genitals. (Hertwig.) Youatt has observed, that the dog shows signs of being delirious and seeing phantasms. The animal stares at a spot on the wall, suddenly darts at it, closes his eyes and drops his head; he will then look round him wildly, and pursue the trace of some object hovering before his mental vision; he is easily frightened, still his consciousness is not destroyed, for he hears the voice of his master, and even obeys his command. 4. Loss of appetite for solid, consistent articles of diet, with a strong inclination for heterogeneous objects, such as wood, straw, leather, wool, fragments of glass, and their own excrements. 5. Changes of appearance, reddening of the conjunctiva, with photophobia; in many a trifling degree of strabismus (Youatt), a rough, ragged coat, and rapid emaciation. 6. Discharge of saliva about the second day of the disease, lasting only ten or twelve hours, and followed by insatiable thirst. (Youatt.) Hertwig states, that the mouth only fills with saliva and mucus, when the pharynx is inflamed. 7. In the further course of the disease, a paralytic affection of the maxillary muscles and of the hind legs supervenes. 8. A negative, but no less important symptom, is the absence of fear of water or hydrophobia; rabid dogs are at all times able to see and to drink either water or other liquids; some only lick the water, but are unable to swallow it on account of the tumid state of the tongue, the pharynx, and the œsophagus. The disease invariably ends fatally, within from four to eight days; there is generally a gradual increase of exhaustion, occasionally death is sudden from apoplexy. At the post-mortem, the blood is found dark and tarry; the pharynx, and especially the tonsils, are swollen and inflamed; the epiglottis is found congested, and the posterior surface of the larynx is inflamed. (Youatt.) The mucous membrane of the stomach is most frequently found inflamed, and the stomach contains a variety of undigested substances, such as straw, hairs, horse-dung, earth, &c., a circumstance not observed in any other disease of the dog. The inflammation not unfrequently extends to the duodenum and jejunum. The brain and spinal cord are found gorged with blood, but they as little as the peripheral without any attempt to drink, in the waking or dosing state, and the obstacle is rather a respiratory than a pharyngeal spasm.

---

[1] See V. Lenhossek: die Wuthkrankheit nach bisherigen Beobachtungen und Erfahrungen, pathologisch und therapeutisch dargestellt; Pesth, 1837, p. 280.

As I do not affect the popular maxim—ignotum per ignotius exponere, I shall take care not to draw analogies with other contagious diseases, in order to determine the pathogeny of rabies. We shall not fill out the chasms in our knowledge of the modus operandi of the hydrophobic poison by mere guessing; the only way to determine the questions at issue is to repeat experiments upon inoculated animals; we must seek to obtain evidence as to the effect of applying ligatures, or cupping-glasses, or excising the inoculated part at different periods, in arresting the introduction of the poison into the system; such experiments upon the non-conduction of the poison should be made on a large scale, in order to arrive at positive conclusions. The nosological relation of the disease has been variously regarded. Some have treated it as allied to insanity, others to convulsions; or again, on account of its traumatic origin, it has been classed with traumatic tetanus. This is manifestly erroneous, as the disease may result from the mere licking of chapped hands or excoriated lips by a mad dog, without any further local injury. On the other hand, the excess of reflex action places the disease in the category of tetanic affections, among which its exact place is defined by the symptoms, which plainly point to an affection of the medulla oblongata; this at once establishes the distinction between hydrophobia and other spasmodic convulsions.

The point just alluded to is also important in reference to prognosis; when rabies has become developed, we know of no remedy that will prevent the fatal issue. The cases that are recorded of a contrary result are untrustworthy, as they do not bear the test of strict criticism. During the period of incubation we may form a more favorable prognosis, but we must not overlook the fact of the absence of all susceptibility for the contagion that exists in a number of cases.

When science affords no sure footing, superstition is sure to flourish; the therapeutic literature of hydrophobia is replete with evidence to this effect. There are only two consolatory points to which the experiments at present conduct us; they are, 1, the certainty of general prophylactic measures; and 2, the possibility of prophylactic measures in the case of the individual. The former may be effected by government, by pro-

[illegible]

[illegible] cupping-glasses may [illegible] but they are [illegible] little [illegible] deserve any [illegible] of [illegible] The actual cautery would [illegible] were there any security of the [illegible] of the wound being exposed to its action. It has therefore been proposed to combine excision with [illegible]. The celebrated London veterinary surgeon, Mr. [illegible], gives the preference to the nitrate of silver over all other cauterising agents. He protected himself by its application on four occasions when he was bitten by mad dogs, and he used it in more than 400 individuals who were bitten by dogs undoubtedly rabid with such satisfactory results that of all these not one was affected with hydrophobia. Rust[1] strongly recommends the use of a solution of caustic potash applied to the wound after excision, of the strength of half a drachm to twelve ounces of distilled water. The majority of authors are in favour of maintaining copious suppuration beyond the usual period of incubation. The sooner after the injury it is possible to take these precautions, the greater will be their preventive power; but they should not be neglected even if a considerable time has elapsed without anything being done.

Some medical men, not satisfied with the adoption of more local prevention, have recommended a general preventive treatment. We here lose all indications, and the doubts necessarily suggest themselves whether the topical or the other remedies deserve the credit of preventing hydrophobia; this remark applies, for instance, to the method pursued by Dr. Wendt[1] in the Breslau Hospital. He kept up suppuration by filling the wound with powdered cantharides, and, at the same time, established copious salivation by the exhibition of calomel, and inunctions with mercurial ointment. We possess no antilyssic remedy which has been proved to be effectual, and neither cantharides, belladonna, nor meloe majalis, have answered the expectations raised concerning them.

---

[1] Theoretisch-praktisches Handbuch der Chirurgie, vol. ix. p. 286.

We cannot dispense with mental prophylactic treatment; everything that soothes and diverts the patients should be encouraged, and everything avoided which tends to recall the remembrance of the occurrence.

When the hydrophobia has made its appearance nothing remains for us to do, but conscientiously to fulfil all the duties commanded by philanthropy; we must entirely eschew all bodily restraint and severity, as the unfortunate individual suffers sufficiently from the conviction of the fatal nature of his disease; all manipulation tending to excite the exalted reflex irritability should be avoided, and this applies more particularly to the repetition of the attempts at drinking, in which the patient is allowed to see the fluid, and to feel it with his lips; the object may be better gained by dropping water upon the tongue, or allowing the patient to suck it through a tube, as in a case of Dr. Bright's, where a tobacco-pipe was employed. To the last moment we should offer the patient cheering consolation, and avoid mentioning the name of the disease.

We are constrained to confess that the therapeutic measures hitherto adopted have only proved "meditationes mortis." A few reports that have been sent over to us from the East Indies, seemed strongly in favour of copious venesection, and excited some hopes that a remedy had been discovered; but Parry[2] has already shown, that these cases bear criticism so little, that we are scarcely justified in adducing them as precedents. No successful case that deserves our confidence has as yet been placed on record. The same applies to opium, the dose of which has been carried to as extravagant a height as in tetanus, for [illegible] has given a patient as much as 180 grains of opium in eleven hours, without producing a narcotic or any other effect. Cantharides, belladonna, mercury, cold affusion, and immersion into cold water, are equally useless. Youatt[1] relates an experiment of inoculating a rabid dog with the ticuna poison, which was followed by a subsidence of the excitement and great calm, but did not prevent the fatal issue. The inhalation of chloroform offers us a sure means of promoting the euthanasia of those unfortunate individuals.

---

[1] Darstellung einer zweckmässigen und durch die Erfahrung erprobten Methode zur Verhütung der Wasserscheu; Breslau, 1824.

[2] Loc. cit., p. 94.

Authors have also assumed the existence of hydrophobia originally developed in man, hydrophobia idiopathica spontanea, as opposed to hydrophobia communicata vel symptomatica;) but, although the analogy with tetanus would favour the presumption, the facts bearing upon the point are so rare and so unsatisfactory, that we can only look upon them as exceptions; we can scarcely help suspecting that, in these cases, the poison was communicated, but that no actual lesion having occurred, the patient had no data by which to recollect the occurrence.

---

[1] Loc. cit., p. 51.

CHAPTER XXVII.

SPASMS FROM EXCITEMENT OF THE BRAIN.

MODERN experimental physiology has done more towards elucidating the motor apparatus of the brain, as well as the sensory, than the older school. Recent inquirers have not only succeeded in determining the regions of the brain, which, when injured in the living animal, give rise to movements, but they have also demonstrated the existence of two forms of spasmodic movements, twitchings and vertigo.

The experiments of Flourens have shown, that twitchings only result from irritation of the medulla oblongata, or the corpora quadrigemina; they are never produced by irritation of the hemispheres of the cerebrum or cerebellum. Irritation of the medulla oblongata induces convulsions on the same side of the body, that of the corpora quadrigemina causes it on the opposite side. Eduard Weber[1] found that movements were only produced by stimulating the corpora quadrigemina, and that they did not occur in the shape of a permanent clonic spasm, as we see in direct irritation of the spinal cord, but presented a constant change; the movements at one time having the character of a concerted arrangement, at another the appearance of irregular clonic spasms.

The most ancient surgical observations mention convulsions as the concomitants of cerebral injuries; and from Hippocrates downwards, most medical men have admitted the correctness of the dictum, that convulsions occur on the injured side and paralysis on the opposite side; this statement has been impugned by Morgagni,[2] who argued that the observers had failed to examine both hemispheres with proper care; and by Flourens, who explained the phenomena by referring them to the combination of the injuries of the cerebrum and cerebellum, with those of the medulla oblongata and the corpora quadrigemina, which had been overlooked previously.

---

[1] Ueber Muskelbewegung, loc. cit., p. 16.

[2] De Sedibus et Causis Morborum, epist. li, art. 46, 47, 48, and Epist. Anat. xiii, art. 14, 17, 18.

The morbid conditions of the brain most commonly accompanied by spasms, whether clonic or tonic, semilateral or bilateral (the former more frequently), are meningitis, morbid growths, hypertrophy, and, though less often, inflammation and softening of the cerebral tissue. The nerves of the eyes and the face are generally involved, and the convulsions prevail in the upper extremities. The relation these convulsions bear to paralysis, is a characteristic feature; they generally precede the occurrence of the latter, rarely following it, but frequently coexisting with it in the other half of the body. Cerebral twitchings are distinguished from those dependent upon peripheral or spinal lesions, by the law of crucial action. Apparent exceptions arise from a misinterpretation of changes met with at the base of the brain, which affect the motor nerves passing off at these points to their peripheral distribution, and give rise to convulsions of the corresponding side, as in the muscular range of the facial, the oculomotor, and other nerves.

It will be necessary to institute further researches into the contradictions prevailing between the facts presented to us by pathology and the results of direct experiment. It may suffice at present to quote a single undoubted case of unilateral twitchings from irritation of certain parts of the cerebrum and cerebellum, which is given by Andral.[1] It occurred in a young woman, aged 27, who was attacked by frontal headache and vertigo after being exposed to intense fatigue. A fortnight later violent twitchings of the left arm supervened, which returned in paroxysms, and lasted about twenty minutes. During the intervals, the motility of the limb was undisturbed. Soon after the left, and immediately after this the right, side of the face was attacked, and participated in the convulsions. Twenty-four hours later, consciousness still remaining unimpaired, the twitchings became more frequent, and attacked one or both sides, the upper extremities with greater force than the lower. They ceased on the supervention of sopor. The mouth became filled with bloody froth, and death ensued from asphyxia. The anterior lobe of the right hemisphere of the cerebrum, two inches below the convolutions, and near the Sylvian fissure, presented a considerable softening of the white substance of a dark red colour, and above a cubic inch in extent. The circumference was marked by considerable congestion. There was so much congestion at the corresponding part of the left hemisphere, that it looked like an ecchymosis; the consistency of the tissue was, however, unchanged.

---

[1] Clinique Médicale, vol. v, p. 427.— See also Abercrombie; Pathological and Practical Researches on Diseases of the Brain, 3d ed., p. 73, &c.

If the anterior lobes of the cerebrum be ever so much irritated in the living animal, convulsions never result. The fact must be explained in the same way as the pains caused by inflammation and disorganisation in the cerebral tissue, though insensible to wounds or injuries.[1] The orgasm of the brain, from the organ being enclosed in unyielding osseous parietes, favours the propagation of a stimulus from the most remote points to the corpora quadrigemina and the medulla oblongata. This is the reason why convulsions commonly accompany hypertrophy of the brain,[2] and why the arrest of the purulent discharge, from penetrating wounds of the skull, often induces twitchings on the opposite side.[3] Abercrombie mentions the case of a child of eight months, whose fontanelle was considerably swollen, owing to exudation within the cranial cavity, and which was seized with convulsions whenever the tumour was pressed.

The twitchings of the muscles themselves, which accompany cerebral disease, in no way differ from the twitchings accompanying affections of the peripheral nerves and the spinal cord. It is very different with regard to the spasms which are produced in the living animal by experiments upon certain portions of the brain, and occur in man and animals as a result of morbid conditions.

---

[1] See vol. I, p. 170.

[2] Andral; loc. cit., p. 599.

[3] Lallemand; Recherches Anatomiques et Pathologiques sur l'encéphale et ses dépendances, vol. ii, p. 122.

CHAPTER XXVIII.

SPASMS FROM EXCITEMENT OF THE BRAIN.

STATIC SPASMS, VERTIGINOUS MOVEMENTS.

Motus Vertiginosi.

ONE form of these movements may be correctly designated as—static spasms, or vertigo.

Experiments.—Older authors, Zinn, Saucerotte, Méhée de la Touche, (for whose views we refer to Gama, 'Traité des Plaies de Tète,' p. 15,) and Arnemann, incidentally speak of rotatory movements occurring in animals after cerebral injuries; but their physiological importance was first duly estimated by that philosopher, whose glance has diffused light wherever it penetrated, Alexander von Humboldt; he says, in his 'Versuche über die Gereizte Muskel und Nervenfaser,'[1] "This revolving of decapitated animals, whose spinal cord continues intact, is one of the most wonderful vital phenomena which have been elucidated by Mr. Arnemann's frightful experiments. I have observed that those frogs particularly continued to hop about in a narrow circle, to whose trunk a small portion of the medulla oblongata, which is very long and flattened in these animals, remained attached. It appeared as if the direction of the gyrations to the right or the left was determined by the residuary portion being larger on the right or the left side. If this was entirely removed, the rotatory movement ceased, but was capable of being re-excited by chemical stimuli, applied to the axillary or sympathetic nerve of the right or left side. It follows that the rotation always indicated a disturbance in the equilibrium in the medullary nerve tissue. In more modern times, the experiments of Magendie and Flourens have afforded important results, which have been confirmed by Krauss and Hertwig, as to the seat and modifications of these phenomena; it is sufficient for our purpose to adduce the following:

"1. Removal of both corpora striata induces an irresistible tendency to advance; the animal shoots straight forwards like an arrow. Removing one corpus striatum only, produces no such effect.[1] 2. Transverse sections of the pons varolii induces a tendency to fall forwards, (Krauss and Hertwig.) 3. Slicing the cerebellum, whether horizontally or vertically, causes the animal to walk backwards, (Krauss, Hertwig, and Magendie.) 4. Section of the corpora quadrigemina of one side, of one pedunculus cerebelli ad pontem, and of one side of the pons Varolii, excites rotatory movements and gyrations of the animal towards the injured side, the eyeballs being altered in their position and distorted; the bulb corresponding to the side of the lesion is turned downwards and forwards, the other upwards and backwards, (Flourens, Magendie.) 5. Division of the corresponding part on the opposite side restores the balance. (Magendie, Hertwig.)"

---

[1] Berlin, 1797, vol. ii, p. 352.

Vertiginous movements were first brought to the notice of the pathologist, by veterinary surgeons directing attention to the rotatory disease of sheep; this is caused by the cœnurus cerebralis,[2] and the variations that occur in the movements are attributed to the different site of the parasite.[3] In the majority of cases, in which the acephalocyst is found within one of the cerebral hemispheres, it has appeared to me, from repeated observations made on the estate of a friend, that the movements are not gyrations, but rather inclinations of the semiparalysed and hemiplegic animals to the healthy side, such as we see in animals in whom one cerebral hemisphere has been removed; Kuers however states, that as the disease advances, the body revolves in smaller and smaller circles, and at last turns on the same spot, so that the feet become entangled in the straw. The cases are rarer in which the animal falls forwards, or in which, from the parasite residing in the vicinity of the cerebellum, or the medulla oblongata, there are vertiginous movements, while the head and neck are bent backwards.

---

[1] Magendie; Leçons sur les Fonctions et les Maladies du Système Nerveux, vol. i, pp. 198, 248, and 280.

[2] Rudolphi; Entozoorum sive Vermium Intestinalium Historia Naturalis, vol. ii, pp. 243—246.

[3] Hertwig; art. Drehkrankheit, in—Encyclopedisches Wörterbuch der Medicin. Wissenschaften; Berlin, 1833, vol. ix, p. 458; and—Kuers, die drei wichtigsten Iugendkrankheiten der Schafe, die Träberkrankheit, Drehkrankheit und Lämmer-Lähmeng; Berlin, 1840, p. 61.

fall forwards. In order to observe the occurrence more carefully, Dr. Friedheim often accompanied the gentleman in his walks; they would continue for five or even ten minutes to walk quietly side by side, when the patient suddenly began to walk quicker, and at last shot forward with a sudden impulse, the body bending forwards more and more, so that it was necessary quickly to lay hold of and sustain him. During the last months of his life, this occurrence was repeated much more frequently; he was even attacked while walking up and down in his room, and he stated—a fact that was confirmed by those about him—that if at the moment when he lost his balance he wanted to seize hold of an object, such as a tree or a chair, he often turned round it two or three times before he attained his object. His moral energy became more and more reduced, and his speech remained heavy and inarticulate. Towards the evening of the 15th of March he was seized with the third apoplectic attack, the right arm and leg becoming paralysed, the breathing stertorous, the pulse slow, the pupils enlarged, and the motions and urine passing off involuntarily. A brief amelioration followed the employment of the suitable remedies on the fourth day. The patient exhibited more consciousness, protruded his tongue, attempted to answer, tried to move the right arm; but, on the following day, the symptoms returned with renewed violence, and death ensued on the 24th of March, 1837. The post-mortem examination of the brain was made by Dr. Henle, in the presence of Dr. Barez, Dr. Friedheim, and myself; the cerebral tissue was found firm and tough, filled with blood, and presenting in the left lateral ventricle a considerable extravasation of recent fresh, lumpy, black blood, which had entered by a rent between the optic thalamus and the corpus striatum from the adjoining hemisphere. In the right corpus striatum a narrow longitudinal cavity was discovered, lined with a dark brown membrane, and surrounded by cerebral tissue, which was rather indurated. The arteries of the base of the brain were for the most part incrusted.

The brain of a woman is preserved in the Berlin museum, (No. 5763,) who suffered from fits, and during their attack always fell forwards. A steatomatous tumour was found in the middle of the pons Varolii.

1. [illegible].—Under this head we include the backward-movements of the body. Friedrich Hoffmann mentions the case of an epileptic patient who ran backwards before the fits, in the following words: 'Dum adhuc sibi constant sensus, angustiae vehementes praecordiorum anxietates et vomendi conatus, turbato tum jam sensibus, instar cancrorum in [illegible] retrorsum, atque tum subito in terram concidit.' Serres[2] also alludes to an epileptic girl of 12 years of age, whose fits succeeded one another very rapidly, and who, when they came on, was seized with an irresistible desire to walk backwards, the head being retroverted. If the head was prevented bending back, the walking in this direction was arrested; the girl subsequently recovered. Taube,[3] in his history of ergotism, relates the case of a patient whose body was pushed back two or three times during the spasmodic attack. When seized by the malady he was not exactly bent back or extended with his head and shoulders, but the entire body was quickly, and several times in succession, pushed back, as if some external force were acting upon him. An entire change of place and position was thus effected: I have often seen this myself. Each time, when the patient recovered his consciousness, he inquired what was being done with him: he never was able to remember what had happened during the fit. In Casper's Wochenschrift für die gesammte Heilkunde, (1837, p. 264,) Dr. Schubert communicates the case of a peasant boy, of 17 years of age, of healthy appearance, who was suddenly attacked with great anxiety and oppression, got very red and hot in the face, lost his speech and consciousness, and then commenced walking backwards. He recovered, after the use of general and topical abstraction of blood, cold affusion to the head, purgatives, and the friction of the nape of the neck with ointment of tartrate of antimony. Latterly, he was only now and then attacked with slight and passing seizures, and then after sunset. In the sixth volume of Magendie's 'Journal de Physiologie,' we find the account of a soldier, who, in consequence of sabre wounds received on the occiput, was seized with an unconquerable desire to walk backwards; and as often as he went

---

[1] Consultationes et responsa Medicinalia, cent. ii, sect. iv, Case CLI.

[2] Anatomie comparée du Cerveau, vol. ii, p. 628.

[3] Geschichte der Kriebelkrankheit, p. 121.

from his own bed to that of a neighbour, he placed his feet from before backwards. He died on the thirteenth day after the injury. The cerebellum proved to be converted into a white pulpy mass, the cerebrum and spinal cord being normal. The following case has come under my own notice.

C. B.—, æt. 62, a silversmith, was attacked six years ago with lacerating pains and loss of motility in the thumb and forefinger of the right hand, extending up the forearm and humerus, and forcing him to give up his employment. A year later he suffered from dysentery, after which his paralytic affection increased, and the leg of the right side also grew weaker. Pains in the occiput and the spinal column extending from the cervical to the lumbar vertebræ supervened, and with these there was a tendency to fall backwards. The pains in the arm yielded to anæsthesia, which, especially in the head and the fingers, attained such a height that he did not feel deep punctures or burning. The skin became dark red and livid. The left hand continued unaffected, with the exception of formication at the tips of the index and middle fingers. The year after the patient applied to me for advice. The point that first attracted my attention was the constrained posture of the strong built man; he bent forwards, and was unable to erect his head, neck, and trunk into the upright position, without at once tumbling back, and, unless he was supported, falling upon his occiput. He endeavoured to counteract the constant vertiginous sensations and the movements by throwing his whole force into this position, and assuming, as it were, a sailing gait in walking through the streets. His organs of special sense and the state of his mind were in no way affected. Nor was there any deviation in the egestive functions, but his sexual energy was extinct, and his testicles, the left especially, proved, on examination, to be atrophied, a point that the patient had himself noticed some time previously. All attempts at treatment were futile. The vertiginous movement increased to such an extent, that he frequently injured his back and occiput by his falls; he would often totter backwards from the window to the opposite door, and then sink. About this time I repeatedly presented him to the students who attended my lectures, many of whom may yet remember him. During the last two years of his life the paralysis increased; complete paraplegia was established, and there was much tremor of the hands and contraction of the flexors, especially of the flexors of the fingers. The loss of sensibility affected the upper more than the lower extremities. The head and trunk were bent forwards, the chin almost touched the sternum, and great force was required to raise the head. Fatuity supervened; the utter helplessness and the involuntary evacuations of the patient, who was excessively poor, rendered it necessary to admit him into the Charité, where his death ensued a few weeks later, being accelerated by gangrene from decubitus, at the sacrum, the shoulder-blades, and trochanters. The section at which I was present yielded the following results: there was sero-albuminous exudation between the arachnoid and pia mater, serous fluid in the ventricles, and incrustations of single cerebral vessels; the cerebellum was of a large size compared with the cerebrum, the surface of the former appearing depressed, as if it had sunk in; there was much fluid in the spinal canal, and the vertebræ were softened at several points. Although the post-mortem examination did not confirm my diagnosis of a tumour at the base of the cerebellum, in the vicinity of the medulla oblongata, it is probable that some degeneration of the same would have been discovered on a more minute anatomical investigation, but owing to the unfortunate absence of Professor Froriep, the superintendent of the pathological department of the hospital, this was omitted.

[illegible] Lateral Impulse

[illegible] have been observed to [illegible] diseases of the brain. [illegible] who remained alive for [illegible] a musket-ball through the [illegible] the posterior lobe of the [illegible] and constantly turned [illegible] at the same time raising his [illegible] related by Saucerotte of a [illegible] and fractured his [illegible] round in bed, so

[illegible]

that it was impossible to apply any bandage. After death the tentorium was found eroded on the right side, and there was considerable accumulation of pus on the cerebellum. Dr. Krieg has communicated a case in which a boy of 11 years of age was struck by a horse on the left half of the os frontis, and lived seven days after the accident, but in perfect sopor and unconsciousness. On the third day after the injury the parents noticed the following remarkable phenomenon, which recurred very frequently in the presence of Dr. Krieg. Whenever the seat of injury was touched, or the patient struck the parts that had become inflamed by counter-irritation, blisters having been applied to the cervix and sinapisms to the calves, and often without such a cause, he uttered loud and distressing cries; he then drew the feet back towards the trunk, laid his hands with extended fingers now upon the thorax and now upon the back, and supported only upon his knees and elbows, his body being suspended in the air, turned round repeatedly upon his own axis; the gyrations were from the left to the right, and they were effected with such force that two persons could scarcely hold him, and with such rapidity that he once made nineteen rotations in eight minutes. If restrained by force he screamed out loud and anxiously, and continued the rotations as soon as the impediment was removed. A judicial post-mortem was made, and showed that the cranial bones, which were thick and strong for the boy's age, were uninjured; a few small hæmorrhagic spots were found between the pia mater and the brain, on both posterior lobes, and upon the right hemisphere of the cerebellum. On removing the dura mater from the base of the cranium, the anterior edges of both small alæ of the sphenoid bone, were found torn from the orbital plate of the frontal bone by a separation of the suture; both were separated about half a line, and the extreme points of both alæ minores were broken off.

We owe the following interesting instances of rotatory spasms to Dr. Belhomme.[1]

Miss G—, aged 60, had been attacked in her 47th year, after a violent mental affection, with giddiness and weakness

---

[1] Considérations sur le tournis chez les Animaux et chez l'Homme,—in the 'Troisième Memoire sur la Localisation des Fonctions Cérébrales et de la Folie;' Paris, 1839, p. 424.

[illegible] place she
[illegible] was
[illegible] circumstances [illegible]
[illegible] turned to the
[illegible] was not subsequently
[illegible] Her judgment
[illegible] in her
[illegible] The
[illegible] she came
[illegible] ushered
[illegible] deprived
[illegible] owing to
[illegible] was doubled
[illegible] upon the edge of
[illegible] to *the*
[illegible] with some
[illegible] to the *left*,
[illegible] muscles of her *face*
[illegible] large and im-
[illegible] and the eyes did not
[illegible] them. The attacks
[illegible] as they ceased, the
[illegible] and recovered.
[illegible] attacks recurred very frequently,
[illegible] times in one day, with great
[illegible] supervened. The insanity dimi-
[illegible] movements increased, and *vice versâ*.
[illegible] catarrh supervened, and on the 18th
[illegible] suddenly. At the post-mortem examination
[illegible] of the size of a hazel-nut were found in the inner
[illegible] occipital bone, at the sides of the basilar groove,
[illegible] The tumour at the left side was larger
[illegible] the right. On removing the dura mater which
[illegible] and was thinned, they presented a wrinkled
[illegible] On each side of the crura cerebelli, and especially
[illegible] there was a marked impression, corresponding
[illegible] exostoses. They presented a greyish colour, and
[illegible] was softer in the vicinity of the pons Varolii.
[illegible] about one third smaller than usual, and its
[illegible] showed a semilunar injection, both ends of

which were turned towards the cerebellum. The corpora quadrigemina, especially the anterior pair, were very small, and softened in texture. The walls of the fourth ventricle were grey, soft, and disorganised; the calamus scriptorius was scarcely to be distinguished. The thalami optici were normal, the corpora striata small and flattened. The left middle lobe of the cerebrum was more voluminous than the right, whilst the right hemisphere of the cerebellum was larger than the left. The optic nerves looked atrophied. The fifth nerve of the left side was softened, and was easily detached at its insertion.

I may here refer to the history of a patient of mine suffering from facial neuralgia, (see vol. I, p. 37,) who, during the last year of his life, was affected with vertigo, and an inclination and rotation of the body to the left side; in him the left peduncle of the cerebellum was softened and congested, while the right was normal. Several patients of this description have recently come to my notice; but they presented no paralysis of any portion of the body, by which the rotation of the symmetrical statics might be disturbed. At this moment a girl of 26 years is under my hands, who presents the most undoubted symptoms of cerebral disease, and whatever position she may assume, she is pushed over to the right side, and this sometimes happens with such force that she is obliged to seize hold of some object to support herself. The extremities of the same side are in the undisturbed enjoyment of the function of motility.

Alcohol intoxication is not rarely the cause of static spasms, and especially of vertiginous movements with an impulse forwards.

Experimental physiology has succeeded not only in demonstrating the static powers, which are allied to special portions of the brain, the derangements of which are manifested as vertigo, but has also shown the seat of the power *which coordinates the movements.* Flourens[1] deserves the credit of having discovered the cerebellum to be the organ which controls the balance and consentaneousness of the movements necessary for locomotion. When the cerebellum is injured or destroyed in various animals, they lose the power of walking, hopping, flying or climbing. By removing the superficial layers in the pigeon, the movements become feeble, and show a want of regularity. When the middle layers are attacked, the walk becomes unsteady and can only be effected with the aid of the wings. When the last layers are destroyed the animal entirely loses the faculty of hopping, flying, walking, or standing. It is only able to sustain the erect posture by propping itself on its wings and tail. It will yet attempt to fly or walk, but there is a mere fluttering without any definite or designed movements; they resemble, in fact, the first attempts of the young fledglings when they are leaving the nest. At last the power of resting upon its legs, tail, and wings is also lost, and the bird keeps tumbling over. When placed upon its back it exhausts itself in fruitless endeavours to rise. The senses and sensation continue unimpaired; after it has become quiet, the slightest noise, the most trivial stimulus, calls forth a repetition of the restless attempts; the bird sees the threatened blow and tries to avoid it or seeks to escape, but is unable to do so. There is a possibility of effecting consentaneous movements, but the faculty of combining them to a definite end is abolished. These observations have been confirmed by Hertwig and others, who have repeated the experiments in the most positive manner. The only link wanting was the proof derived from the converse state of things, the exaltation of this peculiar power of coordination. Experiments instituted in animals afford no clue to this point; but morbid conditions present us with phenomena, which may be interpreted physiologically by reference to the views we have been advocating, and it is to these that I would apply the term co-ordinated spasms.

---

[1] Sur les Propriétés et les Fonctions du Système Nerveux; Paris, 1824, p. 77.

CHAPTER XXIX.

SPASMS FROM EXCITEMENT OF THE BRAIN.

CO-ORDINATED SPASMS.

Gesticulations and locomotive spasms occur paroxysmally, varying in regard to time, space, and intensity, rarely isolated, and most frequently complicated with other cerebral affections.

The forms of the disease are as manifold as the combinations of the motor fibres in the central apparatus, that are effected in exciting the muscular groups to motion, may permit; and, we accordingly find, that every variety of movement which may be excited by the will occurs in the co-ordinated spasms. The patient, however clumsy and awkward he may be at other times, is seen during the attacks to possess an increased and even exaggerated power of equilibrium; he hops, jumps, climbs, swings, and performs these movements with extreme rapidity, and with frequent variations; many of the cases reported have undoubtedly been exaggerated, but some remarkable instances have been recorded by thoroughly trustworthy observers.[1] However great the exertion, it appears that a sense of great fatigue rarely follows, although these movements last much longer than any produced by an effort of the will.

The co-ordinated are frequently complicated with static spasms, or pass into one another, a circumstance that need excite no surprise, as both rest upon the same basis. A case of this kind has been described by Dr. Watt[2] with extreme minuteness. The disease affected a girl of 10 years of age, and commenced in the month of January, with violent headache, vomiting, loss of speech, and an inability to assume any other position of the body than the erect posture, from the time she awoke until she went to bed. At the beginning of February rotatory movements supervened, she turned round like a top from morning to evening with extreme rapidity, and in the same direction, and felt unwell as soon as the movements were interrupted. They ceased at the end of the month, and the headache now returned with great violence. A fortnight later such debility showed itself in the muscles of the neck, that unless supported the head fell on one side, forwards or backwards. The pain in the head then ceased, and speech returned; but at the end of March a new rotatory movement commenced, she rolled from one end of the bed to the other, or even along an entire avenue in the garden; sudden affusion of cold water did not arrest her, and once when she was laid at the side of a shallow rivulet, and the water played upon her, she made no attempt to escape, but continued her gyrations as if she were in a bath. Her arms were not affected, but were frequently extended rigidly, as in tetanus. At times the entire body became stiff for an instant, and the rotatory movement ceased, but returned again directly after. From time to time her respiration became much impeded, and sometimes she effected from twelve to twenty gyrations without breathing. A month and a half passed without any change in the symptoms, towards the end of April a new series of phenomena took place; she would lie on her back and almost bring her head and heels together, so as to form a complete arch, then suddenly relax the position and fall down upon the bed with great violence; after a brief interval of rest, she resumed the same movements. She repeated this ten or twelve times in the minute, at first for six, and at last for fourteen hours daily. After five weeks another change took place. Supporting herself upon her knees and elbows, she pressed her occiput upon the bed and then raised her trunk and legs to the ceiling, allowing the entire weight of the body to rest upon the cervix and shoulders. As soon as she had effected this, every muscular action ceased, and she fell back upon the bed like a corpse. She immediately resumed her position, and this was repeated from twelve to fifteen times in a minute, for fifteen hours every day, from 8 a.m. to 11 p.m. The father then took her out of bed and held her firmly on his lap. At first she resisted violently, but she gradually became pacified, and took a little nourishment, which she also did in the morning before the attacks supervened. At the request of the medical attendants the father also took her out of bed in the course of the day and held her, but she struggled in the most terrible rage; former attempts of this kind, accompanied by threats and castigation, had availed nothing. When left to herself she continued her movements beyond the usual time, and even through the entire night. In order to remove every suspicion of simulation, the room was darkened in the morning, and the candles lit as if it were night, and everybody was ordered to withdraw; but this had no effect. On one occasion, when Dr. Watt visited her in the morning, between seven and eight o'clock, he found her sitting upon her father's lap, she was quiet, but so shy that he was unable to see her face. The pulse was regular, and about ninety. A few minutes before the usual occurrence of the paroxysms, she became restless, the head turned in various directions, the features became distorted, the lower extremities twitched and contracted; at last she began to kick about and to resist her father, and upon his laying her upon the bed the paroxysm at once commenced. There was obstinate constipation, and emaciation, the skin was harsh and dry, and the temperature of the extremities reduced. Although consciousness continued during the paroxysm, the intellectual faculties presented features resembling those of chorea. The remedies hitherto used (cold baths, leeches, and an issue,) produced no effect. An attack of diarrhœa, which supervened, was accompanied by an improvement in her condition, which was more and more established by the continued employment of purgatives. When she had entirely recovered, she exhibited a reluctance to speak of her illness, but several expressions proved that she distinctly remembered what had occurred even when the disease was at its height.

---

[1] See Wichmann; Ideen zur Diagnostik, 2d ed., vol. i, p. 144.—Thilenius; Medic. und Chirurg. Bemerkungen, vol. ii, p. 10.—Wicke; Versuch einer Monographie des grossen Veitstanzes und der willkührlichen Muskelbewegung, pp. 120—129.

[2] Medico-Chirurgical Transactions, vol. v, pp. 3—19.

Co-ordinated spasm occasionally enters into a combination with chorea; of this, I have met with an instance in a boy of 6 years, who was occasionally attacked with an irresistible desire to climb, in spite of every impediment; in the intervals he was affected with chorea.

Consciousness is rarely quite unaffected in these spasms; so that the patients are able to render an account of the impulse that induces the movements, and which they are unable to resist. A case of this kind has occurred in the Policlinik, which is under my direction, and has been observed during several years by Dr. Franque, who undertook the management of it, and has minutely and accurately described it.[1]

"Louisa A—, at present 16 years and a half old, enjoyed perfect health till the month of November, 1845. She had passed through the ordinary infantile diseases, and her physical and intellectual development was in every way normal. The parents, however, frequently observed her to grind her teeth while asleep, and to stretch herself, during which act the body was drawn backwards. In November, 1845, she was seized with general debility, which was particularly marked in the lower extremities; headache and a sense of heat also supervened. She was unable to support herself any longer on her feet, and she was forced to keep her bed. The mother observed twitchings to occur in the limbs at night, and, after a time, they also showed themselves by day. At the commencement of March, 1846, these twitchings passed into complete opisthotonus, which even at that time attacked the patient on alternate days, during the forenoon. At the same time, the parents observed that the intellect of their daughter was different during the attack from its condition during the free intervals.

"In the month of March the scene suddenly changed, and the disease entered its second stage. A series of attacks and phenomena developed themselves, which were carefully watched by gentlemen attending the Policlinik, by which means every suspicion of any simulation was removed. An aura announced the paroxysm between twelve and one o'clock in the day. The patient felt its approach, was seized with great anxiety, and begged to be undressed. Violent respiratory spasms supervened; rapid stertorous inspirations alternated with low cries and short moanings, and slight twitchings of the arms were also observed. Suddenly the patient appeared to become, as it were, wrapt in her thoughts, rolling her eyes about, or staring at an object; she would suddenly jump out of bed with great rapidity, advance with a firm step, and then sink down into a sitting posture with cracking knees. She started from this position with agility and facility, walked about, and seized various objects, which she held obstinately, or threw violently on the ground. Again, she would lie down on the ground and lie still for a time, with a very irregular pulse. At times she went to the door or the window, shook it with enormous force, stamped upon the ground, attempted to climb up the walls, or to blow away the dust from the floor, clapped her hands, and at last threw herself on the bed, where she lay tossing about. This formed the prelude to the actual fit. The patient sat up in bed, was thrown up three or four times, and again sank down. Suddenly, however, she stood up in bed, and leaped up four times with astonishing force to the ceiling of the room. The father, a robust labourer, was scarcely able to restrain her. Exhausted by these efforts, she would sink down, but immediately after leave her bed, and gyrate six or seven times round the room with excessive velocity, turning from left to right. She sometimes touched objects that stood in her way, and while continuing her movements, called to her father to remove them. Then standing on the same spot, she turned like a spinning-top, and after doing so four or five times, exclaiming "father!" sank into her father's arms, faint, with drooping eye and violent palpitation. Soon after she tore from him and resumed her circular course, repeating it four or five times, and invariably terminating with the spinning movement. This concluded one serial. She now again exhibited the behaviour described as occurring with the aura; and, after a time, the second serial commenced. The number of these serials, taking the entire phenomena from the first start into the sitting posture to the last spinning movement, was not always the same; it was never less than thirteen nor more than twenty. These symptoms were all repeated daily from March to the beginning of September, and continued from two to half-past six o'clock on one day, to two to six o'clock on the succeeding day. After September, they occurred only on alternate days, but still at the same period. The optic nerve executed all its functions, the patient recognised every object, and even caught at her books. It is not stated at this time whether she was able to read. Her hearing was very acute; she heard the most gentle movement, and directed her head to the side from which the sound came.

---

[1] Deutsche Klinik, December, 1849, No. 5.

movements every evening between eight and ten o'clock, which in no way differed from ordinary chorea. Both paroxysms were attended by psychical excitement, and both were preceded by an aura. The patient felt in a state of discomfort, and was sullen and cross. The attacks commenced with a few long-drawn inspirations; those of the evening passed into sleep, whilst those of the morning presented a peculiar termination. In the evening paroxysms the spasms resided in the muscles of the trunk, neck, and cervix, the left side being more affected than the right. The facial muscles seemed to be unaffected, unless we lay a stress upon the frequent corrugation of the forehead. The eyes preserved their usual brightness, though they were sometimes rigidly fixed upon one point; the pupils were much dilated, and the complexion presented no alteration. At times the respiratory muscles were violently affected; she breathed rapidly, hastily, and anxiously; there were long-drawn inspirations only at the commencement and termination of the attack; no yawning was ever observed, but there was often a short moan. The patient, who was silent and perverse at the commencement, gradually became joyous, petulant, and naughty towards her parents, for whom at other times she had the greatest affection. While in this condition, she had the greatest repugnance to every kind of occupation. I have never been able to induce her to read or to knit; she would hold the book upside down, draw the knitting needles out of the socks, and throw the work on one side.

"Her remarks were rational, and in no way beyond her station in life. During the attack she remembered everything that had occurred previously, but in the free intervals she only had a dreamy recollection of what had occurred during the paroxysms. The patient was excessively timid, and clapping the hands caused a violent start of the entire body, even if she saw it done. The evening attack supervened earlier, if she had been affected by any emotion; it intermitted entirely while she was in the open air. I have, however, seen that it occurred instantly upon her entering the room. All the symptoms hitherto described were also witnessed in the attacks of the forenoon, except that the movements were more violent; and that every third minute during the continuance of the paroxysm, there were tumultuous movements of nearly all the

pupils very much dilated, the vessels of the sclerotic coat congested in parts, and the choroid shone through with a blueish tint. She took no notice of various questions addressed to her. When the palms of her hands were tickled she exhibited some reaction, and gradually showed more consciousness of what was going on around her. Pressure applied to the above-mentioned part of the head induced violent spasms; after which she was able to utter a few words, but soon ceased. On repeating the experiment, she recovered her speech for a quarter of an hour. Her attempts to speak were unavailing, however much she laboured to do so, at the same time she was able to laugh out loud and to move her tongue freely. After a few days this condition disappeared, and returned several times subsequently. The general state of health of the patient varied from time to time. She complained chiefly of general debility and headache. Nevertheless, her physical and intellectual development proceeded satisfactorily; and in June, 1848, after a tolerably copious leucorrhœa had preceded, the first traces of menstruation presented themselves. In the month of December menstruation was fully established, though accompanied by great sufferings. The attacks of opisthotonus continued with very slight intermissions for three days, and they were more violent than usual. At the same time there were febricitations, she was unable to speak, and was completely apathetic. The menses had since occurred with perfect regularity, and although the paroxysms have not ceased, they have lost something of their violence. The body, which was wont to fall back upon the bed with its entire weight, now sinks back slowly, as if the force were broken. All other spasms have entirely ceased, and nothing remains in the evening but a state of excitement. The spot on the vertex continues equally sensitive. Physically the patient is completely developed, and is able to walk long distances without being fatigued. Her intellect is also healthy. Her memory has not suffered in the least; her powers of perception are vigorous, but she wants perseverance either for bodily or mental occupation. In the month of September of the present year she suffered from cholera; during this time the attacks ceased; after her recovery from the intercurrent affection, the fits returned as formerly."

The female sex is almost exclusively liable to this disease; it

17

mu
qu
fe
u
h
tl
ra
c
v
n
l
t
s

following an apoplectic seizure, none was so painful to himself as the fact of his applying wrong terms (such as water for wood and the like) to express his meaning, and the suspicion of insanity which he thus excited among his friends. Dr. Bright[1] describes the case of a girl of 18 years of age, who, in consequence of depressing mental emotions, was obliged to sigh involuntarily and very frequently. This passed into a spasm, during the continuance of which she every three seconds uttered a sound like *heigh-ho,* which she sometimes changed into *heigh.* She was only able to control the sound for a short time, if, for instance, she wanted to say a short sentence, but she was unable to combine two or three sentences, without being interrupted by that exclamation.

---

[1] Reports of Medical Cases, vol. ii, p. 458.

having in fun put a mouse into her bosom. The patient remained in the company of her companions for four and twenty hours after she had become thus affected. On the succeeding day three other girls were attacked in the same manner, and on the third day six more. The advice of Dr. St. Clare was requested on the fourth day, but previously fourteen more persons had been seized, so that a total of twenty-four were labouring under the spasms. Among these there were twenty-one[1] girls, the two youngest being only ten years of age, and only one man, who had been very assiduous in rendering assistance to those attacked. Three of the girls lived at about two miles, and three others about five miles from the place where the disease made its appearance. The last three and two others had not even seen any of the patients, but had merely been attacked in consequence of hearing the account of what had happened. Besides the spasms, which lasted continuously from a quarter of an hour to four and twenty hours, and were so violent in some that they required to be held by four or five persons to prevent them tearing their hair or dashing their heads against the wall, the patients suffered from anxiety, dyspnœa, and attacks of suffocation. The cure was soon effected by electric shocks; the disease did not spread after the arrival of the physician, and six days after the outbreak of the malady, which under favouring circumstances might have spread very extensively, all had recovered. This case is distinguished by the absence of any special predisposition to spasmodic affections on the part of the affected girls, unless we look upon their impoverished health from being pent up in the workrooms of a cotton factory, in this light. There was no enthusiasm to account for it, nor is it stated that the patients had been affected by nervous diseases previously.

When there are other influences at play, the most powerful of which are religious fanaticism, and the arrested intellectual growth of the nation, psychical spasms are manifested with epidemic violence, or with endemic pertinacity. Thus the dance of St. John[2] spread in the year 1374 from Aix-la-

---

[1] [Twenty-one is the number given in the original; but whether this is a misprint, or whether two persons who are not accounted for were married women, is not stated.]—Ed.

[2] Hecker's Epidemics; the Dancing Mania, Dr. Babington's transl., p. 87.

Chapelle to Cologne, and continued under the name of St. Vitus's dance until the commencement of the sixteenth century. In the eighteenth century the convulsionnaires appeared in France,[1] and even in 1814 an epidemy of convulsions occurred in Cornwall, excited by religious fanaticism and accompanied by ecstatic phenomena; in a brief period as many as four thousand individuals of all ages were attacked; children of five and six years, and old men of eighty were attacked, though the majority were girls and young women.[2] A few years ago, a similar epidemic occurred in the north of Sweden. An instance of the endemic spread and propagation of psychical spasms is met with in the northern parts of Scotland, where the disease is known by the name of the leaping ague. The attack is ushered in by headache and pain in the loins, upon which fits of hopping or leaping supervene. Sometimes the patients run with extreme velocity over dangerous ground, and then sink down exhausted. In the huts which they inhabit, they climb up the walls, swing round the beams supporting the ceiling, or jump from one to the other with the agility of a cat.[3]

Among the sensual impressions which excite psychical spasms, we must especially mention the organ of hearing. Thus the influence of music upon spasmodic movements shows itself in the rhythm of the dance. An instance on a large scale is afforded by the history of tarantism, a popular disease, which attained its height in Italy in the seventeenth century, and of which Hecker[4] has given an account, which is as spirited as it is critically correct. Among the sporadic cases recently detailed,[5] the one communicated by Wood[6] in the 'Medico-Chirurgical Transactions,' is remarkable for the accuracy of the description. The imitative movements of articulation in disease have not hitherto been the object of investigation. A singular phenomenon, which I should be inclined to call the echo, has repeatedly occurred to me in various morbid conditions of the brain. The patient, in a monotonous way, repeats the words and sentences spoken by somebody in his vicinity, without showing that his attention has been attracted, or that he associates any meaning with what he is articulating. A lady who died of softening of the brain, invariably repeated my questions, as, "show me your tongue," or "will you lift up your arm," without doing as she was bid. I am acquainted with an idiot of 11 years, who in this way mimics music in a remarkable manner. The same phenomenon has occurred to me in two young girls labouring under typhus fever, when the disease was at its height.

---

[1] Le Naturalisme des Convulsions dans les Maladies de l'Epidémie Convulsionnaire, of which Hecquet is the author; Soleure, 1733.

[2] See the Account by Cornish, in—Nasse's Zeitschrift für Psychische Aerzte, vol. i, p. 255.

[3] Edinburgh Medical and Surgical Journal, vol. iii, p. 435.

[4] Dr. Babington's transl., p. 107.

[5] See—Nasse's Zeitschrift für Psychische Aerzte, 3 Jahrg., p. 609.

[6] Vol. vii, pp. 236—256.

CHAPTER XXXI.

SPASMS FROM EXCITEMENT OF THE BRAIN.

EPILEPTIC CONDITIONS.

The converse of the cerebral spasms hitherto considered, are those which are associated with an arrest of consciousness, and have from time immemorial been comprised under the term of epilepsy.

Nobody has hitherto succeeded in producing epileptic attacks in animals by lesions of the brain or spinal cord. Saillant, who was commissioned during the last century by the Académie Royale de Médecine at Paris, to investigate the subject of epilepsy, already remarks, at the close of his treatise entitled 'Expériences faites sur les Animaux pour découvrir le siège et la cause prochaine de l'Epilepsie,'[1] "Nous nous consentons de conclure aujourd'hui qu'il est plus facile de produire un accès épileptique artificiel en agissant sur le sang que sur les nerfs et le cerveau;" however his experiment of injecting atmospheric air into the jugular vein of a horse is unsatisfactory, as it merely induced fatal convulsions. The experiments conducted by Sir Astley Cooper[2] were much more valuable. On tying both carotid arteries in a rabbit, respiration became somewhat accelerated, and the heart's action increased, but no other effect was produced. Five minutes later the vertebral arteries were compressed with the thumbs in such a manner as not to affect the trachea; the respiratory movements were almost instantaneously arrested; convulsive fits ensued; the animal became unconscious, and seemed dying. The pressure was removed; the rabbit recovered its consciousness after a convulsive inspiration; lay on one side; made some violent spasmodic efforts; breathed heavily, and the heart's action was powerful. After two hours it had recovered, except that respiration was still laboured. The vertebral arteries were again compressed; respiration was arrested, convulsions, a cessation of movements and apparent death followed. The fingers being relaxed, the animal recovered with a loud inspiration, but breathed very heavily. After four hours it ran about, and munched some greens; five hours later, compression was again applied to the vertebral arteries, and with the same result; after seven hours, it was cleaning its face with its paws; after the lapse of nine hours, the vertebral arteries were compressed a fourth time, and the effect was the same; thirteen hours after, the animal had recovered itself; four and twenty hours later, the experiment was repeated, and the result was arrest of respiration, convulsions, and unconsciousness; after removing the compression, there was violent and laborious respiration, followed by very rapid inspirations. The compression was applied a sixth time, after a lapse of forty-eight hours, and the phenomena were the same. Thus it appears that after applying ligatures to the carotids, mere pressure upon the vertebral arteries is sufficient to arrest the functions of the brain completely, and to produce convulsions. Very recently Marshall Hall[1] has attempted to show that unconsciousness and the whole train of psychical disturbances occurring in an epileptic paroxysm, is owing to a compression exerted by the contracted cervical muscles upon the subjacent veins, and to the impeded return of the blood from the brain, but no proof is given that such compression is really effected by the spasm of the individual muscles of the neck; that, for instance, the internal jugular vein is compressed by the sterno-cleidomastoid and the omohyoid, or the vertebral vein by the scaleni. The time has passed when we can rest satisfied with a mere hypothesis, however attractive it may appear. In hysterical paroxysms, and in the convulsive throes of tetanus, there is no unconsciousness; on the other hand, in the abortive forms of epilepsy, the psychical disturbances prevail, while scarcely any convulsive action is manifested.

---

[1] In Histoire de la Société Royale de Médecine, ann. 1782-83, pp. 88—96.

[2] Some Experiments and Observations on tying the Carotid and Vertebral Arteries, &c., in Guy's Hospital Reports, vol. i; London, 1836.

The epileptic states vary according to whether the altered excitability causes fatal exhaustion by one or more fits, or is

---

[1] On the Neck as a Medical Region, Lancet, 1849, Nos. vii and ix; and—Synopsis of the Diastaltic Nervous System; London, 1850, p. 65.

the gums, and the rapid emaciation. Lead colic sometimes precedes, or is developed simultaneously with this affection; it rarely follows; the same applies to the neuralgic pains in the extremities. (See vol. I, p. 155.) Saturnine paralysis is met with very rarely, and amaurosis is also of rare occurrence. The fatal issue is very common, and takes place in the proportion of one out of four cases; it results from asphyxia or apoplexy, often occurring suddenly when the fits have recurred with such frequency that an interval was scarcely perceptible. At the post-mortem examination we may find the brain presenting the yellowish, earthy, dirty hue peculiar to lead poisoning, and not unfrequently the alteration in the cerebral tissue termed hypertrophy. We then discover the gyri to be flattened and compressed, so as almost to obliterate the sulci; the ventricles narrowed; the membranes and the tissue dry; the colour pale; the consistency firm and dense, and the volume increased. It is also important that in two cases sulphate of lead has been found in the brain. In the majority of cases, however, the brain and spinal cord present no appreciable differences.[1] The return to health takes place gradually; the patient shows a great tendency to somnolency, and for a few days looks like a person who has just awoke from sleep. Rayer and Tanquerel des Planches recommend an expectative treatment as the one most likely to benefit the patient, as all violent remedies only accelerate the fatal issue. The employment of purgative enemata, of flying blisters applied to the lower extremities, and of cupping, assisted by a suitable diet, is preferable to the use of cold affusion, opium, or croton oil.

Eclampsia is also induced by blood poisoning, resulting from the contagion of smallpox, scarlet fever, or from the retention of substances that ought to be secreted, as is the case in renal diseases.[2] In cases of this kind, especially when recent, it has been found that venesection, assisted by the local abstraction of blood and counter-irritation, exerts a speedy and permanently beneficial effect, as I have had the opportunity of observing in a patient of 16 years of age, who applied as an out-patient at the Hospital on the 29th of October, 1846.

---

[1] Tanquerel des Planches, pp. 348—363.

[2] Addison—On the Disorders of the Brain connected with Diseased Kidneys: Guy's Hospital Reports, vol. iv, p. 1.

[illegible]

[illegible] passed violently, [illegible] was [illegible] after the lapse of a few hours the [illegible] in exactly the same [illegible] of twelve ounces, to have [illegible] affusions to the head, and [illegible] of buck- [illegible] consciousness was perfectly [illegible] trifling headache remaining. [illegible] taken place with the saline [illegible] affusions to the head and the pur- [illegible] for two days. On the 2d of [illegible] passed, a quart and a half of turbid [illegible] which was not diminished. [illegible] From this date, the patient was [illegible] water as his ordinary beverage, and [illegible] that on the [illegible] of November [illegible] the persistence of the albumen [illegible] process was continued. At the end of the year the patient again presented himself in the clinical theatre, and the urine was found to be normal. It has since been repeatedly examined, and the result has proved the cure to be permanent.

Eclampsia parturientium.—The convulsions coming under this denomination break out suddenly, and the patient is at once deprived of consciousness. The face and neck swell, and become red and livid. The carotid and temporal arteries pulsate violently, and the jugular veins swell; the eyelids are distended, the eyeballs are elevated or stare rigidly and their vessels are congested, or they roll about under the closed eyelids. The tongue projects, and is bitten by the grinding teeth, causing it to bleed, and bloody froth issues from the mouth. The facial muscles twitch, the limbs are curved or stretched, and again contract with lightning-like rapidity. The whole trunk is at one time rigid, immoveable, drawn backwards or to one side; the next moment it is thrown about by twitchings and convulsions, so violent that the patient can scarcely be restrained. The muscles of respiration, and especially the diaphragm, are implicated; there is danger of suffocation. Vomiting supervenes, and urine and excrements escape involuntarily. The temperature is raised, the face drops with perspiration. The pulse is very frequent, full and strong, or weak and hard. The abdomen is tympanitic; the uterus is hard, and this hardness increases as often as convulsions are renewed. The os uteri is closed, or only slightly patulous.

An attack of this kind rarely lasts less than five minutes; it generally continues for a quarter or half an hour, and occasionally extends over four and twenty hours; in this case, the spasms remit and again exacerbate, alternating or combining with apoplectic conditions. If the first outbreak is not fatal, a remission follows; consciousness returns gradually, but the patient is generally unable to remember what has occurred, even if she has given birth to a child during the attack. The pulse remains accelerated, a few muscular groups continue to oscillate, the head feels heavy and painful, the abdomen is sensitive, and there is extreme exhaustion; the eyelids then again begin to twitch, the lips tremble, the face becomes red, the head is drawn backwards and thrown from side to side, a fresh outbreak ensues, generally increased in violence, and this manner above twelve fits may recur in one day, althoug it is more frequently the case that recovery or death follo after the second or third.

It is more frequent to find the disease appearing witho any precursory symptoms than with them; occasionally find headache, scotomata, vomiting, yawning, a sense of weig and pain at the epigastrium and hypogastrium, and numbne of single extremities, preceding the attack.

The *cadaveric inspections* hitherto recorded are incomplet owing to the spinal cord not having been examined. In t cranial cavity we generally find considerable congestion, i creased density of the cerebral tissue, plastic and sanguineou extravasations between the membranes and in the ventricle in the latter chiefly when apoplectic symptoms, a profound sopo stertorous breathing, &c., have been associated with the co vulsive affection.[1] Thus, I found a small coagulum at the ba of the anterior lobe of the left hemisphere, in a woman of 2 years of age, who was in the eighth month of her third preg nancy, when she was one night suddenly seized with violen headache, unconsciousness, and convulsions; death ensue twelve hours after. The uterus is generally perfectly normal

Eclampsia makes its appearance most frequently at the a proach of parturition, during its actual occurrence, and durin the last two months of pregnancy; it is less common aft delivery, and is met with least of all before the sixth month pregnancy; though hysterical paroxysms have been occasional mistaken for the severer malady. Primiparæ are more pr disposed than those who have gone through numerous preg nancies and deliveries. Of forty-eight patients observed Merriman, thirty-six were primiparæ; ten cases attended Champion were all primiparæ, (Velpeau, ibid.) Eclampsia doe however, occur in the second, third, and subsequent pregnanc Dumont mentions a woman who suffered from the disease her eleventh pregnancy, (Velpeau, ibid.) Hamilton and Nage state, that twin-births predispose; others attribute a predi posing influence to pregnancy occurring at an advanced period of life. Plethoric, well-fed, robust individuals are liable to the affection, and Osiander, Hamilton, and others, consider œdema and anasarca to encourage it. The most common exciting causes are emotions, and particularly alarm and vexation; next in order, gastric repletion, retention of urine owing to pressure of the gravid uterus upon the bladder, local impediments in the genitals, which render the employment of instruments necessary; violent hæmorrhage and retention of the placenta. Yet, although all these causes are in frequent operation, the disease itself is of rare occurrence. My friend, Dr. Mayer, has only met with five cases during fifteen years, in the course of which he has attended 2500 labours; the celebrated midwife, Madame Lachapelle, in Paris, has only seen it 68 times in 38,000. Other accoucheurs have had a larger share; thus, in Merriman's practice, it occurred 48 times in 2000 births. Future investigations must determine whether albuminuria, which often supervenes during pregnancy, may, when fully developed during the last months, possess any etiological influence. It would be a bold assumption to ascribe any influence to the osteophyte of the cranium discovered by Rokitansky, and which is formed in every pregnancy.

---

[1] See—Hauck; Einiges aus dem Gebiete der praktischen Geburtshülfe; in- Casper's Wochenschrift der gesammten Heilkunde, 1833, vol. i, p. 133; and- Velpeau, Die Convulsionen der Schwangerschaft während und nach der Entbindun Uebersetzt von Bluff: Köln, 1835, p. 86.

The disease under consideration threatens the life of two individuals, the mother and the child; above one half of the women attacked, died within twelve, twenty-four, or thirty-six hours; the danger is greater during the last months of pregnancy than during and after parturition. When eclampsia is associated with profound sopor and stertorous breathing, it is almost invariably fatal. Plethoric, robust females are in greater danger than weak and hysterical subjects. When the intervals are very short or become imperceptible, death is at hand. Eclampsia rarely passes into other diseases. It is only in a few cases that metritis and peritonitis are developed, or that partial paralysis remains in consequence of hæmorrhage having taken place. (Velpeau.) After a favorable termination the patient entirely recovers her strength. The prognosis is even more unfavorable as regards the child than the mother; the infant almost invariably dies when the disease occurs during the last months of pregnancy; it may be saved when the eclampsia supervenes during parturition.

and applies it by the aid of a syringe invented for the purpose; the os uteri, according to his statement, becomes relaxed in half an hour.

If the eclampsia continues in spite of these measures, we may yet attempt powerful derivation (especially by applying the hot hammer to the cervix), the local abstraction of blood, cold fomentations and affusions, while hot fomentations are applied to the abdomen and legs, powerful clysters of æthereal oil of turpentine, or assafœtida, or the inhalation of chloroform; but these remedies rarely avail anything when parturition, whether effected naturally or artificially, has failed to arrest the malady. Denman recommends sprinkling the face with cold water, which he has seen followed by good results in several cases. In one case in which the patient had already been bled, and other remedies had been used, he placed a basin of water before him and sprinkled water upon the patient's face with a plumeau, whenever the convulsions threatened. The convulsions were stopped each time, and only broke out once with any violence, when the sprinkling was omitted. A living child was born fifteen hours later.[1]

We are rarely able to remove the cause of the malady unless we find that there is some gastric irritation; in which case several writers recommend the employment of a powerful emetic; or in cases of hæmorrhage after parturition, when, of course, the first indication is to arrest the flow of blood, and general bleeding can rarely be adopted.

Eclampsia puerorum.—This disease is commonly ushered in by premonitory symptoms, occurring a day or two before the actual attack. The most usual are,—irritability and loss of the joyousness of childhood, restless sleep of short duration, with starting, lagophthalmus, the sardonic grin, trembling and starting when the body is touched or from sensual impressions, headache, alternate flushing and pallor of the face, a fixed state or rolling movement of the eyes. However, the paroxysm may supervene suddenly with a scream, without any precursory symptoms. The facial muscles twitch, the trunk becomes rigid and immoveable, shortly after spasmodic action supervenes, the head and neck are drawn backwards, the limbs are forcibly extended

---

[1] Marshall Hall—On the Diseases and Derangements of the Nervous System, p. 331.

vened. On the 24th of the month, the paroxysms having returned at the same time, one grain of the sulphate of quina was ordered four times daily; upon this they gradually abated, at last passed into a slight rigor, and on the 15th December ceased altogether. One year later the boy was affected with bronchitis, and the fits had not returned in the interval. The disease ran a similar course in a boy of twelve years, who, when first seen, had been attacked with eclampsia every evening for eight successive days; the fit was preceded by vertigo, and no appreciable cause could be shown to exist. In this instance the intervals being quite free from disease, quinine was exhibited in doses of five grains daily; the convulsions gradually disappeared, and in their place there was merely headache, vertigo, and sickness. Two scruples of quinine sufficed to restore the patient entirely.

A certain period of life, from birth to the seventh year, and especially the first period of dentition, predispose to the disease. It is undeniable that an hereditary constitution exists, for in some families almost all children are attacked with eclampsia. Elsässer[1] has recently drawn attention to a point which had not previously been remarked, viz., the softening, thinning, and perforation of the occiput or cranio-tabes, which he looks upon as the form of rhachitis peculiar to the first months of life. The osseous tissue is thinned, flexible, soft, and porous, defects being especially perceptible along the lambdoidal suture, and at the occiput, with the exception of the protuberance. The holes, which vary in number, and may amount to as many as thirty, are easily recognised by the touch, the adjoining parts are very compressible, and they feel like stiff paper, or a distended dry pig's bladder; they emit a similar sound when touched. The defects in the bone are filled up by the pericranium and the dura mater, which are adherent to one another, so that they appear to form one membrane. The symptoms that mark the affection, are tenderness of the occiput to the touch; and when recumbent, endeavours on the part of the child to escape from this annoyance induced by change of position and movement, sleeplessness, inclination to press the forehead against a firm object, quietude as soon as it is carried about in the erect posi-

---

[1] Der weiche Hinterkopf. ein Beitrag zur Physiologie und Pathologie der ersten Kindheit; Stuttgart, 1843.

or bent, and the legs are drawn up to the abdomen. The twitchings are occasionally confined to single muscles, or in rare cases to one side, or they proceed from the abdominal muscles and ascend. At the same time consciousness and sensation are in abeyance. The staring eye sees not, passing the finger over it causes no blinking; the pupil is immoveable, dilated, or contracted; the ear is insensible to a loud noise. The pulse is small, very frequent, and often not to be counted, the breathing tumultuous, and the temperature elevated.

After the duration of a quarter or half an hour and more, the spasms gradually cease; sometimes, though rarely, they are arrested suddenly. The facial muscles in the former case and the muscles of the extremities vibrate from time to time, while the physiognomonic expression indicates the return of the perceptive powers. The child is exhausted, and often falls to sleep more or less soundly than in health. The excretions, especially those from the intestines, are generally abnormal. Thin, greenish-yellow evacuations of a fetid or acid smell are discharged spontaneously, or after the exhibition of laxative medicines, generally accompanied with colicky pains. Several attacks commonly follow one another; in one of my own children, they returned during one night regularly every half hour as the clock struck. The more frequent they are the more violent they become, so as at last scarcely to be separated by a free interval; they then generally terminate fatally; the less frequent the fits, the more marked the interval, and the more sure and rapid is the return to health, so that the child that we left apparently moribund will be found an hour or two later playing with its toys. The fits occasionally run a regular periodic course, and assume the quotidian (rarely the tertian) type. A boy aged 5, who was brought to the Policlinik on the 10th Nov. 1846, and whose mother had suffered from eclampsia during pregnancy, had for eight days previously been subject to attacks of eclampsia, which recurred daily between four and five o'clock in the morning, and were preceded by headache. As there was a large accumulation of ascarides, purgatives of calomel and jalap were ordered, the effect of which was that no regular paroxysm occurred up to the sixteenth, but that every day at the same time headache and giddiness, and an occasional distortion of the right ala nasi and angle of the mouth, supervened. On the 24th of the month, the paroxysms having returned at the same time, one grain of the sulphate of quina was ordered four times daily; upon this they gradually abated, at last passed into a slight rigor, and on the 15th December ceased altogether. One year later the boy was affected with bronchitis, and the fits had not returned in the interval. The disease ran a similar course in a boy of twelve years, who, when first seen, had been attacked with eclampsia every evening for eight successive days; the fit was preceded by vertigo, and no appreciable cause could be shown to exist. In this instance the intervals being quite free from disease, quinine was exhibited in doses of five grains daily; the convulsions gradually disappeared, and in their place there was merely headache, vertigo, and sickness. Two scruples of quinine sufficed to restore the patient entirely.

A certain period of life, from birth to the seventh year, and especially the first period of dentition, predispose to the disease. It is undeniable that an hereditary constitution exists, for in some families almost all children are attacked with eclampsia. Elsässer[1] has recently drawn attention to a point which had not previously been remarked, viz., the softening, thinning, and perforation of the occiput or cranio-tabes, which he looks upon as the form of rhachitis peculiar to the first months of life. The osseous tissue is thinned, flexible, soft, and porous, defects being especially perceptible along the lambdoidal suture, and at the occiput, with the exception of the protuberance. The holes, which vary in number, and may amount to as many as thirty, are easily recognised by the touch, the adjoining parts are very compressible, and they feel like stiff paper, or a distended dry pig's bladder; they emit a similar sound when touched. The defects in the bone are filled up by the pericranium and the dura mater, which are adherent to one another, so that they appear to form one membrane. The symptoms that mark the affection, are tenderness of the occiput to the touch; and when recumbent, endeavours on the part of the child to escape from this annoyance induced by change of position and movement, sleeplessness, inclination to press the forehead against a firm object, quietude as soon as it is carried about in the erect position, scanty hair, and falling off of the hair at the occiput, not merely as a result of the restlessness and the friction, but also from the looseness of the roots of the hair, so that it can be pulled out easily by handfulls; there is irritability and starting, and in the majority of the children there are clonic or tetanic spasms in combination with spasm of the glottis. If these terminate fatally, as is frequently the case, a febrile condition, with symptoms of permanent cerebral irritation precede; and at the post-mortem we find hyperæmia and inflammation of the membranes of the spinal cord. Cranio-tabes is most commonly developed in the second trimestrial period of infant life, and the spasms commonly supervene in the third. If the children survive longer, rickety distortions of the thorax and in the epiphyses of the bones of the trunk often supervene. Half the children succumb.

---

[1] Der weiche Hinterkopf. ein Beitrag zur Physiologie und Pathologie der ersten Kindheit; Stuttgart, 1843.

In speaking of spasm of the glottis, we have already adverted to the relation of this disease to eclampsia, (vol. I, p. 335.) The following may severally act as exciting causes: the irritation of dentition, the food of the child, in infants at the breast changes produced in the mother's milk by emotional influences, passions, and other affections, in older children the precocious employment of spirituous beverages, and the abuse of narcotics, though this does not occur as frequently now as formerly; intestinal irritation, whether from over-repletion or helminthiasis, necessarily more frequently after the first two years of life than previously, or swallowing foreign bodies, may also act as exciting causes; of the latter I have lately met with an instance in a child of three years, which, while playing with its brothers and sisters, was suddenly seized with eclampsia, which lasted half an hour: on recovery, a dose of castor oil was administered, and the child passed a marble per anum, which it had before put into its mouth and swallowed. The passage of biliary and renal calculi sometimes operates in a similar manner in adults. The impression produced by intense heat (*coup de soleil*), or cold, sometimes gives rise to the malady, as well as mental emotions, which are often overlooked in children; and I speak not only of fear, anger, alarm, but also of jealousy, envy, and sorrow.[1] Metastatic processes and injuries of the head not unfrequently possess an etiological influence.

---

[1] See—Corvisart's translation of Auenbrugger's work: Nouvelle méthode pour connaître les Maladies internes de la Poitrine, Paris, 1808, p. 178; and Brachet; Mémoire sur les Causes des Convulsions chez les Enfants; Paris, 1824, p. 104.

The fatal issue is generally caused by apoplexy, in which case the cerebral tissue is found to be very turgescent and much congested; hydrocephalus is not so frequent a termination. Recovery is secured by the crisis of the brain, sleep, or occasionally by intestinal evacuations.

In selecting our *treatment* the diagnosis is of extreme importance, as many errors have been committed from confounding eclampsia with inflammatory affections of the brain; in our days *inflammation of the brain* is a collective term, like one formerly in vogue, *fits*. I must refer the reader to the detailed description of inflammation of the brain[1] for the minute features, but I may indicate the two main forms which are recognised by marked characters. In the one, there is from the commencement a tumultuous disturbance of the cerebral functions, pain, convulsions, and delirium, complicated with sopor, the latter often becoming so prominent as to cause the disease to resemble apoplexy; in the other, there is a gradual progress and development; some of the cerebral functions suffer first; the first symptoms are pain, convulsion, or paralysis, confined to certain parts; disturbance of the psychical powers supervenes; the complication of symptoms becomes more extended, and more manifold; sopor terminates the series.[2] There are no free intervals as in eclampsia; there is a steady progress in the symptoms, and even when we master the disease, it does not terminate abruptly, nor is there a sudden transition to health.

In order to remove the cause it is imperative upon us, in the first instance, to attend to the part borne by the blood. In children who have previously been healthy, robust, and plethoric, during the period of dentition, or in the course of acute exanthems, it is proper to abstract blood, locally in young children, by venæsection in elder children. But in atrophic children the opposite condition, anæmia, may obtain, after profuse discharges; in this case excitant remedies are advisable.

---

[1] [Professor Romberg refers to the third division of the work, which will treat of the Trophoneuroses, and which has not yet appeared.]—Ed.

[2] See Diagnostische und Therapeutische Bemerkungen über Hirnentzündung im kindlichen Alter, in—Wochenschrift für die gesammte Heilkunde, 1844, p. 473.

Nor is it less important to attend to gastric disturbance. When the stomach is suffering from repletion, or the ingestion of noxious substances, an emetic is urgently required; nor should we allow ourselves to be deterred from its employment by the apparent danger of the possibility of cerebral congestion. The derivative effect of alvine evacuations is useful; calomel and castor oil are the most suitable means for this purpose, and may appropriately be combined with enemata of cold water and vinegar. The violence of the spasms, however, by impeding deglutition, often renders it impossible to fulfil the indicatio causalis; a powerful impression is required in order to remove the arrest of the cerebral functions; my own experience teaches me to consider nothing so adapted to secure this object as the affusion of cold water to the head, while the body is in the warm bath; or if the latter cannot be at once procured, the cold water may be poured over the child while it is sitting on its nurse's lap and the head is held over a pan. The affusion must be repeated every hour, or at longer intervals, according to the requirements of the case. When the convulsions have abated, we may apply the remedies above mentioned, but must carefully eschew narcotics, and avoid placing too great reliance on medicines that do not correspond to their reputation: to this class the preparations of zinc more especially belong. After the convulsions have been arrested it is well to continue the use of purgatives for some time. When eclampsia offers an intermitting type, the employment of quinine is indicated. When the disease occurs in infants at the breast, we must subject the mother and the nurse to a strict bodily and mental regimen. When we are called to treat children labouring under cranio-tabes, Elsässer[1] especially recommends attention to be paid to giving the soft and compressible occiput a suitable support in the shape of a horse-hair cushion, with a pyriform opening; into this the occiput is received, so as not to be in contact with anything. The preparations of steel and tan baths (made by adding two or three handfuls of ground oak bark to each bath) are strongly recommended.

---

[1] Loc. cit., p. 205.

CHAPTER XXXII.

SPASMS FROM EXCITEMENT OF THE BRAIN.

EPILEPSY.

In order to give a complete delineation of epilepsy, it is quite as important to render the characters which mark the interval as those which belong to the paroxysm.

Description of the Paroxysm.—There frequently are premonitory symptoms of a sensitive, motor, or psychical character; among the former, we class the hyperæsthesiæ of the nerves of the senses, which we so often meet with; sight and hearing are more commonly affected than smell. Two of my patients imagined that they saw human beings and animals, sparks, and luminous flames, immediately preceding the epileptic attacks. Gregory[1] has observed a patient who, before the attack, imagined he saw a little old woman with a red cloak, who ran up to him, and gave him a blow on the head, upon which he fell down. Vertigo accompanied by painful and abnormal sensations in the head, and at distant parts, is a frequent precursor. These sensations are generally comprised in the term aura epileptica, and the patient describes them as resembling a cool or warm puff, or draught, which mounts from the extremities to the thorax and neck, and on reaching the head passes into the paroxysm. The aura, however, but rarely corresponds to its name, as has been already pointed out by Prichard,[2] a most careful observer of epilepsy. I have found the symptoms to occur in about one half of my epileptic patients; in some it assumes the form of formication in the tips of the fingers or toes, affecting one, or less frequently, both sides; in others, it appeared as a creeping sensation in the circumference of the mouth; in a few, as a sudden sensation of heat diffused over the entire body. I have also met with it in the shape of a painful, lacerating, dragging sensation, mounting upwards from the lower extremities, or as hemicrania or mastodynia. The motor aura is not unusual; it occurs as twitching or contraction of the fingers or toes, or of one hand, one foot, one leg; or as spasm of the sterno-cleido-mastoid, drawing the head down on one side. In some patients I have seen twitchings of the muscles of the alæ nasi and the upper lip, which are supplied by the facial nerve; in one, there was the extremely rare phenomenon of spasm of the auricular muscles. (Vide vol. I, p. 292.) Occasionally a sudden relaxation and loss of motility precede. Attacks of a static character are also met with, such as turning round in a circle, walking backwards, (Fried. Hoffmann,) or running forwards.[1] The premonitory symptoms may be of a psychical character, and present themselves as ill temper, melancholy, sleepiness, incapability for mental exertion, absence of mind, and occasionally, though very rarely, as extreme euphoria, (bien être.)[2] I have met with one young man who had been subject to epilepsy for nine years, and who previous to the attack was, as he expressed himself, suddenly seized with a very peculiar train of thought, which was not quite intelligible to him, but caused him intense anxiety. The thoughts were always of the same character, and while he was making the effort to disembarrass himself of them, the paroxysm supervened. Little attention has hitherto been paid to the precursory symptoms occurring in the sphere of nutrition. I am informed by Dr. Schönbein that in several patients who were blistered, he observed that immediately before the fit the serum assumed an acrid character, as in Humboldt's galvanic experiment.

---

[1] Watson; Lectures, &c., vol. i, p. 612.

[2] See his admirable Treatise on Diseases of the Nervous System; London, 1822, p. 88.

§

The paroxysm often breaks out abruptly without any warning. The patient, if he happens to be standing, falls on his occiput or side, or, though less frequently, on his face, uttering a piercing cry that alarms both mankind and animals. The convulsions that supervene are more often general, than confined to one side or to a small spot. The head is alternately thrown sideways, or forwards and backwards; the histrionic and masticatory muscles act violently; the forehead is drawn up and down; the eyebrows are corrugated and again relaxed; the eyelids blink and are half closed, so that, as the pupil is turned up, only the white of the eye is visible; the pupil is insusceptible to the stimulus of light, and generally contracted; the mouth is distorted; the teeth grind, or chatter; the extremities suddenly bend, are stretched or are rotated inwards or outwards; the fingers, and especially the thumbs, are bent across the hollow of the hand, and the toes are flexed. At times the spasms are of a tetanic character; when the attack supervenes, the trunk suddenly becomes stiff and inflexible, the head is drawn rigidly to one side or backwards; the arms and legs are stiff and distended, the eye wide open and staring, the jaws compressed, and the tongue jammed in between the teeth and bitten. The fit often commences with a stiffness of the muscles, and then in a brief space of time passes into convulsive movements. The movements of respiration are accelerated, short, irregular, and more or less impeded; if inspiration is in any way arrested, the expiratory muscles act violently. The patient screams and groans. Occasionally the muscles which are under a sympathetic influence are involved, and excrements, urine, and semen are ejaculated during the paroxysms. The heart beats rapidly and irregularly. There is always cerebral insensibility to sensual or tactile stimuli, whilst reflex sensibility continues. I have convinced myself of this fact by introducing a feather or my finger under the eyelids of an epileptic patient, during the paroxysms, and finding that they instantly and forcibly contracted. It is well known that the surface is insensible to punctured and cauterised wounds; but I have repeatedly observed, that sprinkling the face with cold water during the paroxysm produces the same starting of the body as it does in a healthy individual. We have yet to inquire into the manifestations of reflex action resulting from irritation of the mucous membrane; as to whether, for instance, sneezing is produced by the introduction of acrid vapours into the nose, or cough by irritant fumes. Consciousness is entirely in abeyance from the commencement of the paroxysm to its termination. In the vegetative sphere we also meet with phenomena which result

---

[1] Jos. Wenzel; Beobachtungen uber den Hirnanhang fallsüchtiger Personen, p. 50.

[2] [The vernacular English offers no word which expresses the meaning of this term; as it appears to convey a definite sense, and as the auther frequently employs it, it is proposed to introduce it into English medical terminology. It is scarcely necessary to add, that it is a Greek word, *εὐφορία*, meaning, the capability of bearing anything well, or a happy frame of mind.]—Ed.

[illegible] The patie[illegible] weak, and out [illegible] gradually recov[illegible] sleep to pass fr[illegible] resume their or[illegible]

[illegible] modifications [illegible] with other c[illegible] but even [illegible] is found to [illegible] paroxys[illegible] of the disease o[illegible] they occur between [illegible] moment [illegible] spasmodic agitation [illegible] some, the m[illegible] Esquirol's Ver[illegible] these abortive fits th[illegible] occurs. The paroxy[illegible] of the phenomena is [illegible]

[illegible] Animal. vol. i. p. 3[illegible] modified by a complication with a psychical affection. A maniacal condition may become associated with the paroxysm, generally accompanied by excitement and violence, and lasting from a few hours to several days.

The relation existing between epilepsy and paralysis, and which is indicated in a few cases that are on record, is a point of some interest. The younger Pinel has communicated the case of a female idiot, aged eighteen, who was affected with paralysis of the left side. The hand was forcibly bent upon the forearm, and could not be stretched; in walking, which was very much impeded, the left leg dragged. She was subject to epileptic fits, occurring at intervals of about five and twenty days, and then lasting almost without intermission for from thirty to forty hours. She was seized on the 24th of December, 1821, with a paroxysm of this description, which terminated fatally on the fourth day, and during which the paralytic limbs of the left side participated in the violent convulsions. In the necropsy the cranial bones were found thickened, and of eburnian texture; the right hemisphere was atrophic, the cerebral fossi very small and compressed, especially at the frontal and occipital region. The cortical layer presented greater thickness than usual. The lateral ventricles were very small and dry. The cerebral tissue of the right hemisphere, especially under the ventricle, exhibited a remarkable hardness, while the left hemisphere was of the normal consistency. At the region of the eighth and ninth dorsal vertebra, a portion of the spinal column was found to present a pulpy consistency, the diseased portion being defined above and below by a reddish hue, which separated it from the healthy tissues. The sciatic nerve of the left leg, which had long been subject to paralytic contraction, proved to be reddish, and more voluminous than the corresponding nerve of the healthy side.[1] Another case is reported in Moulin's work;[2] it is that of a woman 57 years of age, who for seventeen years had been subject to paralysis of the right side, and had lost the power of speech owing to an apoplectic attack. Two years later she was seized with epilepsy, which recurred regularly every week, and only affected the paralytic limbs. The paroxysm was ushered in by violent pains; the patient uttered a loud cry, lost her consciousness, twitched, foamed at the mouth, then fell into a sleep which lasted two hours, after which she recovered. Copious hæmorrhage into the cerebellum was followed by death. A large apoplectic cyst was discovered in the corpus striatum, and the thalamus opticus containing a sanguinolent serum, underneath which the cerebral tissue was hardened to the extent of three lines, and presented a yellowish-red colour.

---

[1] Lallemand; Recherches Anatomo-pathologiques sur l'Encéphale et ses Dépendances, vol. iii, p. 288.

[2] Traité de l'Apoplexie, 1819, p. 74.

The duration of an epileptic attack, when measured by the convulsive stage, as it generally is, lasts from five to ten and fifteen minutes, but if we estimate the different stages collectively, it varies much both among different individuals and in the same subject. The incomplete eruptions often last a few seconds only, while hours and days are required for the evolution of a complete fit. The duration and progress of the disease also exert an influence upon this point; at the commencement the outbreaks are generally shorter than later on, and as the disease increases in intensity the paroxysms become prolonged.

Description of the interval.—Epilepsy, like hysteria, is characterised by features peculiar not alone to the fits but also to the intervals, and which are the more distinct the longer the disease has persisted; they serve as evidence that the constitution of the individual has undergone an entire change. These features, which require to be studied more fully to render our knowledge of them tolerably complete, manifest themselves in the nervous system, as well as in other portions of the organism. In the former, they appear either as the residue of individual symptoms of the paroxysm, as the delirium maniacum and ecstaticum, which may continue for weeks, or as trismus, which in one of my patients continued uninterruptedly for from fourteen to twenty-one days after the fit; or they may present themselves as new affections. One of the most frequent of these is aphonia; the patients, after the comatose stage, though perfectly conscious, find themselves deprived of their voice; in spite of the strongest stimuli, they are unable to produce a sound, and remain dumb for several weeks, till a fresh attack restores the voice. Marshall Hall[1] mentions the case of a patient who, every time that he had had a paroxysm, lost the capability of singing a few of his high notes. In a similar manner dysphagia or bronchial asthma, or vesical ischuria may supervene; the latter causes violent pains and resists the introduction of the catheter, lasts several days, and is sometimes not arrested until the supervention of a fresh paroxysm. Considerable tympanitic distension of the abdomen, with violent pains, tenderness to the touch and on pressure, not unfrequently follow the paroxysm, and may even mislead the inexperienced medical man, from the symptoms resembling those of peritonitis. In addition to these passing affections, an enduring reaction of the disease during the intervals is most distinctly shown in the intellectual powers of the individual. It is characteristic to find a loss of memory, and a diminution in the definiteness of the ideas, combined with greater irritability of temper; a point that was first introduced into forensic medicine by Ernst Platner,[1] for the purpose of estimating the criminality of acts committed by enlarged epileptic subjects. Esquirol remarks, that those epileptics also who are not attacked with insanity are very irritable, capricious, paradoxical, and difficult to deal with, and that their character is peculiar. The expression of the features changes and becomes coarse, there is an appearance of precocious senility; even Aretæus[2] observed, that epilepsy is a destroyer of beauty. The features become distorted, the eyebrows form a larger arch than usual, the axes of the eyes are placed irregularly and obliquely; if the patient looks straightforwards, the cornea is directed too high upwards, and is slightly concealed under the upper eyelid, so that a large portion of the white becomes visible, the lips and the cheeks are somewhat distorted. Cazauvieilh[3] states, that old epileptic subjects have an insecure tottering gait, and stiff and slow movements. The sexual feelings are excited, and epileptic subjects incline to every kind of sexual indulgence. The change in the constitution of an epileptic individual shows itself by the relation of the organism to external influences, and to the internal economy, even in a more marked degree than in hysteria. The tolerance of remedies is the subject that first attracts our attention; general and copious abstraction of blood and its frequent repetition, are but badly borne by epileptics; and we see in this a marked difference from apoplectic conditions. On the other hand, there is a great tolerance of nauseating remedies, and especially of metallic salts; doses of from ten grains to a scruple of sulphate of zinc, as prescribed by Bright, Babington, and others, could scarcely be given in other diseases without exciting vomiting. It appears that the susceptibility for epidemic and contagious diseases is diminished in epileptic patients; Esquirol, however, saw that these patients were not exempt from typhus, although their mortality was much less than that of other classes; he states that of fifty who were attacked, but a very small number died,[1] a fact previously observed by Greding.[2] Finally, it is important to attend to the relation borne by diseases occurring in an epileptic constitution; in the majority of instances, they are less dangerous than they are under other circumstances; and this applies not alone to trismus, tympanitis, and ischuria, but even to inflammations, hæmorrhages, &c.

---

[1] On the Diseases and Derangements of the Nervous System; Lond., 1841, p. 327.

---

[1] Facta violenta Epilepticorum, quamvis maleficiendi et ulciscendi consilio suscepta, amentiæ excusatione non carere, in: Quæstiones Medicæ Forenses, autore Platner; Lipsiæ, 1824, p. 40.—See also Brach; über die Insana malitia Epilepticorum, in Rust's Magaz. für die gesammte Heilkunde, 1838, p. 1; and Friedrich, Systematisches Handbuch für die gerichtliche Psychologie, p. 637.

[2] Edit. Boerhaave, p. 28.

[3] De l'Epilepsie considérée dans ses rapports avec l'aliénation mentale, in Archives Générales, 1825, p. 66.

Epilepsy runs a chronic course; the individual attacks occurring with greater or less frequency, and with more or less regularity of repetition; points that are much influenced by the duration of the disease, the age of the patient, sex, certain vital processes, and accidental causes. At the commencement of the disease, the paroxysms not unfrequently are far apart, six months and even a year intervening, a point that should be well attended to in respect to prognosis and to therapeutics. In youthful subjects and during the period of development, the fits approach nearer to one another. The periodical occurrence of the paroxysms in the female sex often depends upon the sexual processes; there is a monthly type, or the paroxysms become more frequent and more violent at the time of menstruation. A female patient of mine was seized every four weeks; every paroxysm lasted twenty-four hours, so that during this time, twelve fits occurred, which were separated from one another by a stage of coma which lasted nearly two hours. It was remarkable that the patient did not recover herself entirely until the whole paroxysm had passed off; but if the twelve fits failed to take place, the patient continued to complain of a sense of discomfort and anxiety, until the deficient fits had presented themselves. In one young girl, the fits at the commencement of the disease occurred punctually every other day at five o'clock in the evening; quinine had no other effect than that of effacing this regular type. Dr. Henoch who accompanied a young man, subject to epileptic fits, who was a patient of my own, to Heligoland, found that the attacks which had previously occurred at irregular intervals of a longer or shorter duration, assumed a definite type during the use of the sea-baths; they took place uniformly between eight and half-past eight o'clock in the morning, on every seventh day; this type disappeared as soon as the patient had left the watering place. The waking and sleeping states exercise an undoubted influence upon the occurrence of the paroxysm; that this does not depend upon the position of the sun or the difference of the diurnal period, is proved by the fact that epileptic subjects, who have their fits when asleep are also attacked during broad daylight, if they happen to yield to Morpheus.[1] The planetary influence of the moon (especially of the new and full moon,) upon the course of epilepsy, was known to the ancients, and although here and there doubts have been raised against this view, the accurate observations of others have established its correctness; Esquirol is opposed to it, and says that in the Parisian Hospitals no relation has been observed between the frequency of the fits and the phases of the moon. Stahl[2] and Mead[3] are in favour of the doctrine; the latter mentions the case of an epileptic girl aged 5 years, whose attacks came on daily with high water and ceased at low water; and this occurred with such punctuality, that the loud scream with which the patient invariably recovered from her fit, was the signal which awoke the father, a waterman living at the Thames side, and told him that it was time for the com mencement of his business. Some authors are inclined t ascribe a similar influence to the equinoxes as to the luna changes; Clarus[1] has observed, that the greatest frequency o epileptic seizures occurs in spring.

---

[1] Dictionnaire des Sciences Médicales, vol. xii, p. 515.

[2] Sämmtliche Medicinische Schriften, vol. i, p. 288.

---

[1] Prichard; loc. cit., p. 92.—Esquirol, p. 281.

[2] Theor. Medic., pt. ii, sect. 3, numb. 3, p. 683; and Dissertatio de Hereditaria Predispositione in Varios Morbos; Halæ, 1706, § 76, p. 48.

[3] Opera Medica, edit. Goetting, 1748, p. 28.

When epilepsy lasts a long time, it very frequently becomes complicated with psychical derangement; it rarely does so from the commencement. A statistical analysis made by Esquiro has shown, that of 339 epileptics, 269, or four fifths, were in state of mental alienation; the most frequent form being dementia, next in order mania, and though rarely, monomania.

In estimating the necropsies of epileptic subjects, authors have not hitherto proceeded with sufficient critical acumen, and have introduced the morbid changes caused by complications or cadaveric alteration as essential to epilepsy. Too little attention has also been paid to the duration of the disease, in judging of the post-mortem appearances, though this is necessarily a point of great consequence. It is only necessary to examine the osseous envelopes of the brain to be convinced of this. The longer the epilepsy has existed, the thicker the cranial bones become, and they assume an almost eburnean density. The prominences of the inner surface project strongly and sharply, so that it is almost painful to pass the hand over it. Greding,[2] whose writings are distinguished by their accuracy and minuteness, mentions that he found sharp projections at the posterior clinoid processes, and either at one or both sides. Osseous deposits in the dura mater, in the falciform process, and other parts, occur frequently in epileptic subjects. The membranous investments present the appearances common to chronic affections of the brain, in the shape of thickening of adhesions, sero-albuminous exudations, and a large number of Pacchionian glands,[3] which are mainly seated on the surface of the cerebrum. The examinations of the brain have not generally afforded any very instructive results; a consequence partly of the incompleteness of the mode of investigation, partly of the complication with other diseases, whose morbid changes have been set down as the effects of epilepsy, *e. g.* hæmorrhages and their residuary products. Ferrus states that hypertrophy of the brain, with an increased density of the medullary tissue, and with hypertrophy of the cranial bones, is very commonly met with in epileptic subjects; Parchappe[1] also speaks of the weight of the brain being considerably increased. The researches of Joseph Wenzel, with regard to the relations of the pituitary body in this disease, promised more positive results; he found that hypertrophy, or atrophy of one or both lobes of the pituitary body, inflammation, exudations of the surface and between the lobes, reddening and swelling of the infundibulum, occurred in combination with morbid changes in the neighbouring bones, such as contraction or dilatation of the sella turcica, obliquity, shortening or thinning of the posterior ascending lamella.[2] These changes are not met with uniformly in cases of epilepsy;[3] and, on the other hand, disorganisation of the pituitary body occurs without epilepsy, as proved by the case of facial neuralgia previously described, (vol. I, p. 43,) and by Engel's[4] excellent monograph on the pituitary body and the infundibulum; yet Wenzel's investigations, which will ever serve as a pattern of accurate research, are of importance, because they have for their object the consideration of the morbid processes of the anterior cranial vertebra; this encloses the pituitary gland, which, according to Antenrieth, Burdach, and Arnold, is to be looked upon as the continuation, and, as it were, the bud of the grey centre of the spinal cord. The experiments made by Sir Astley Cooper on the subject of the arrest of the circulating current in the vertebral and carotid arteries, and the condition of their osseous channels, should be an inducement to renewed research into the existence of similar influences in epilepsy. Esquirol[5] was the first to direct attention to the state of the spinal cord in epileptic subjects.

---

[1] Der Krampf, in Pathologischer und Therapeutischer Hinsicht Systematisch erläutert, p. 248.

[2] Sämmtliche Medicinische Schriften; Greitz, 1790, vol. i, pp. 277—350.

[3] Jos. et Carol. Wenzel; De Penitiori Structura Cerebri hominis et brutorum; Tubing, 1812, p. 12.—Greding; loc. cit., p. 290.

---

[1] Recherches sur l'Encéphale, sa Structure, ses Fonctions, et ses Maladies; Paris, 1838, 2 Mémoire, p. 204.

[2] Joseph Wenzel's Beobachtungen über den Hirnanhang fallsüchtiger Personen, nach seinem Tode herausgegeben von Carl Wenzel; Mainz, 1810.

[3] Romberg; Ergebnisse einiger Leichenöffungen,—in Horn's Archiv für Medic. Erfahrung, 1823, p. 255.

[4] Engel; über den Hirnanhang und den Trichter; Wien, 1839.

[5] Loc. cit., p. 311.

The cadaveric changes most frequently met with are,
congestion (hyperæmia) of the spinal membranes and partial softening
especially in the lumbar region. It is, however, impossible
determine whether these changes have not existed simply
complications, as we do not possess the histories of the
some cases communicated by Ollivier[1] indubitably demo
strate the existence of such a relation.

Causes.—The chief predisposing cause is that due
hereditary influence. Cazauvieilh and Bouchet have ma
some statistical inquiries into this subject, both in t
descending and ascending line, and have found that of
epileptic patients, there were 31 who had epileptic parents
relations, or nearly one third. Fourteen epileptic mothe
gave birth to 59 children, 37 of whom had died, the oldest
the age of 16, the remainder at a very early age, and almo
all in convulsions. Twenty-one survived, of these 16 w
healthy; though very young, some were already epileptic.
has sometimes been observed that a generation has be
passed over; the near relation existing between epilepsy a
insanity is also shown in the hereditary predisposition;
often find that insanity affects the parents or relations
epileptics. The outbreak of hereditary epilepsy general
takes place before puberty. Besides the hereditary pr
disposition, we also find a congenital taint spoken of; but it
a very rare occurrence to find new born infants subject
epileptic attacks, they generally supervene at a later perio
after the first dentition, or after weaning, and they may th
also be due to an hereditary taint. The instances of mothe
who, after a fright, or from seeing an epileptic patient, g
birth to children labouring under this complaint, witho
themselves having been affected, are not sufficiently authe
ticated. The predisposition afforded by a certain age is
much more consequence; the proclivity to the disease duri
the first four quinquennial periods of life is three times grea
than it is subsequently. Cazauvieilh has compared sixty-
cases in reference to this point. They were distributed
follows:—

---

[1] *Traité des Maladies de la Moelle Epinière*, 3d ed.: Paris, 1837, vol. ii, p. 5

From birth to the 5th year	18	Total, 50.
the 5th „ 10th „	11	
„ 10th „ 15th „	11	
„ 15th „ 20th „	10	
„ 20th „ 25th „	5	Total, 16.
„ 25th „ 30th „	4	
„ 30th „ 35th „	1	
„ 35th „ 40th „	2	
„ 40th „ 45th „	1	
„ 45th „ 50th „	2	
„ 50th „ 55th „	0	
„ 55th „ 60th „	1	

I have attended an old lady of 56 years of age, who in her fifty-fifth year, after the cessation of her menstrual period, was seized with epilepsy, the paroxysms of which only occurred at night-time. Instances of the occurrence of epilepsy at a later period of life are very rare: Maisonneuve, in his valuable work, 'Recherches et Observations sur l'Epilepsie,' has communicated two cases, one of which occurred in a man of seventy-two years, who was first attacked in his sixty-ninth, the other in a female of seventy-five, who was first seized in her sixty-second year. According to Tissot and Esquirol, the difference of liability, owing to sex, is not manifested until the seventh year, after which the female sex appears to be more prone to the disease than the male sex. The influence due to climate and ethnical relations has not as yet been determined.

The question of the connection existing between the etiology and the diagnosis of the complaint, is one of too great importance not to attract our consideration also. When epilepsy occurs at the earlier periods of life, and before puberty, it is generally followed by idiocy, and is frequently complicated with paralysis of single members. The attacks, as Maisonneuve, an accurate observer of Pinel's school, states, are always incomplete at the commencement, afterwards generally occur without any premonitory symptoms, and only last a short time. The convulsions are neither violent nor general, and they mainly affect the face and upper extremities. The intervals are often of considerable duration, and occasionally the disease ceases during childhood to return in manhood.

The causes inducing epilepsy that reside in the nervous system may occupy the peripheral or central tracts. But few cases are on record of the morbid excitant being seated in the cerebro-spinal, and none to my knowledge of its being found in the sympathetic system. One of the oldest observations is given by Short (1720); in this, there was a neuroma of the size of a pea in the vicinity of the muscles of the calves; De Haen[1] communicates another, in which two neuromatous tumours occupied the phrenic nerve, and in which there was atrophy of the thalami optici. Two others are quoted by Henning[2] of neuroma of the vagus and of the crural nerve. Instances of local affections, especially about the extremities, which to judge by the symptoms appeared to reside in the nerves themselves, have been described by Portal,[3] Maisonneuve,[4] Larrey,[5] and others. In one quoted by the second of the authors mentioned, there was traction caused by two cicatrices on the foot resulting from a venesection; in a case mentioned by Larrey, there was injury to the internal cutaneous nerve, caused by an operation at the elbow-joint. The following occurred under my own observation. A labouring man of robust constitution, who applied for relief in the Policlinique, had fallen three years previously upon his right knee, in consequence of which the joint had become disorganised. The patient had from this period suffered from epileptic attacks. The aura epileptica commenced as a creeping sensation in the large toe of the right foot. From here it mounted upwards along the inner surface of the leg and thigh, and ended in the epileptic seizure. In this case the aura did not proceed from the seat of injury, the knee-joint; but when we consider that the sensibility of the integuments at the inner side of the knee-joint, as well as those of the large toe, is derived from the same nerve, the saphenus major, the connection between the aura and the cause of disease seems undeniable. Among the symptoms which characterise that form of epilepsy which originates in a peripheral affection of the nerves, the aura, which is both of a sensory and a motor character, deserves the first mention. At the commencement of the disease it exists by itself, and is only occasionally associated with vertigo and confusion of intellect as it passes upwards. After a time the complete paroxysms are developed, during the intervals of which, however, abortive fits are yet often perceptible. The patient at the same time often complains of a painful sensation, or of spasm at a definite point, which is increased by external contact and pressure. Occasionally a small tumour, or some discoloration may be discovered. The attacks themselves may frequently be intercepted by isolating the point from which the aura takes its origin.

---

[1] Ratio Medendi, p. 127.

[2] Analecta Literaria Epilepsiam Spectantia; Lipsiæ, 1795, p. 38.

[3] Cours d'Anatomie Médicale, vol. iv, p. 247.

[4] Loc. cit., p. 207.

[5] Clinique Chirurgicale, vol. i, p. 490.

Strong impressions made upon the nerves of the senses, and especially upon the optic nerve, have occasionally given rise to epileptic seizures. Maisonneuve relates two striking instances of this. One occurred in a girl of 5 years, who amused herself one summer's day by looking at the sun for several minutes, and was thereupon attacked with epilepsy, to which she remained subject for nine years afterwards: the second patient, when 9 years of age, had stared at the sun for several minutes, and was much alarmed at seeing what she took for a large black head; in the evening of the same day she related the circumstance to her mother, and was at once seized with epileptic convulsions, which afterwards returned at tolerably regular intervals. Tissot[1] mentions a young man who was seized with epilepsy whenever he saw a red object.

The causes of epilepsy that reside in the brain are not unfrequently injuries and their consequences, as well as diseases of the cranial bones from constitutional affections, such as syphilis, &c., instances of which may be found in the annals of surgery. This variety of epilepsy occurs more frequently in the male than in the female sex, and increases with age; if diseases of the bones are the origin of the complaint, the fits are easily induced by external pressure upon the skull. In the intervals the patient complains of abnormal and painful sensations in the head, and does not enjoy the same health that we find in other epileptic subjects. In the course of the disease apoplectic conditions and paralyses supervene. The eccentric aura is a point of physiological interest; it affects the side opposite to the one in which the disease of the cerebral hemisphere resides, and is generally confined to the upper extremity. Odier[1] mentions the case of a soldier, who, after having received a sabre-cut across the left side of his head, often suffered from spasmodic contractions of the little finger of the right hand, which subsequently extended to the forearm, shoulder, and neck, and each time ended in an epileptic seizure. After having tried numerous remedies without any result, Odier advised him to bind a cord tightly round the arm at two places, between the elbow and wrist and between the shoulder and elbow; by following this suggestion, the epileptic paroxysms were staved off for three years. On one occasion the patient forgot it during a fit of intoxication, and he died during the attack that followed. At the post-mortem examination, a trace of the sabre-cut was found in the left parietal bone, with a projection of the internal osseous lamella of a carious character. Underneath the dura mater a sanguineous tumour of soft consistency and about the size of an apple was discovered at this point, containing a quantity of clear watery fluid.

---

[1] Abhandlungen über die Nerven und deren Krankheiten, deutsch herausgegeben von Ackermann, vol. iii, p. 283.

Mental influences are far more frequent causes of epilepsy than injuries; among forty-four cases, the causes of which were carefully examined by Cazauvieilh, we find that in thirty-one their origin was attributable to an influence of this character. No disease is so liable to be produced by fright as this affection, which may itself be excited by the sight of an epileptic paroxysm; the next most frequent influence of this description is fear, an agent that came into operation more often in former times, when tales of ghosts and hobgoblins were the bane of the nursery, than at present; anger also comes under this category as an exciting cause. The female sex is chiefly predisposed, and is the more liable to be affected if the mental excitement operates during the catamenial period; there are also numerous instances on record, of attempts to commit rape inducing the sudden outbreak of epilepsy. The middle period of life generally remains exempt. Mental emotions that have induced the first attack are very apt to reproduce it subsequently, and if delirium supervenes, it generally turns upon the first cause of alarm. Thus Maisonneuve[2] mentions a woman who, thirty-six years after the first fit, fancied, during the maniacal stage, that she saw the man who at that time had, during her menstrual period, struck her on the back with a spade. The simulation of epilepsy also operates as a mental influence, and is said occasionally to pass into the real disease.

---

[1] Médecine Pratique, p. 181.

[2] Loc. cit., p. 51.

Next in order to the nervous system, we have to consider the blood and the vascular system in their etiological relations to epilepsy. The time has scarcely elapsed at which congestion of the brain was looked upon as the almost exclusive cause of nervous diseases, and also of epilepsy. In the present state of science, an assertion of this kind to be tenable requires to be supported by well-founded arguments; it is surprising, therefore, that hypertrophy of the left ventricle, a morbid condition which of all others gives rise to an increased flow of blood to the brain and induces hæmorrhage, scarcely ever causes epileptic seizures, though it is frequently associated with vertigo, apoplexy, and paralysis. There can be no doubt that plethora arising from the suppression of accustomed sanguineous discharges, especially catamenia, epistaxis, and though less frequently hæmorrhoids, or from an injurious mode of life, may exert a predisposing influence. The variety of epilepsy arising in this way presents an apoplectic admixture; there are weak convulsions, followed by a soporous state, which may last for hours and even for days, as well as by incomplete paralysis of individual parts, especially of the tongue. The opposite condition, anæmia, is more frequently the source of the disease, and especially in the female sex, whether resulting from an original bloodcrasis, or from insufficient nourishment and from profuse discharges. Maisonneuve[1] relates the case of eighteen sailors, who having saved themselves on a rock by swimming away from the enemy, were for seven days exposed to great deprivation and severe cold; four weeks after they had been received into an hospital they were seized with epileptic attacks, before and after which they suffered very violent pains in the right hypochondrium. Ten months after, six had died, eighteen months later eight more, and only four survived.

Among the profluvia, those associated with over-excitement are the most fertile sources of epilepsy, such as self-abuse and sexual excesses; there are individuals, especially of the male sex, who are seized with epilepsy after every act of coition,

---

[1] Loc. cit., p. 229.

The uterine system, often under the influence of an anæmic state of the constitution, occupies an important position in the etiology of the disease. Menstruation is undeveloped, irregular, suppressed, or too frequent, but rarely profuse; the mammæ swell and become indurated periodically, and there is fluor albus; there are permanent or occasional pains in the hypogastric region; hysterical paroxysms precede for a long time, and afterwards alternate with the epileptic paroxysms; the latter themselves present some hysterical features; we find the globus hystericus occurring as an aura, or there are respiratory spasms, imminent suffocation, singultus, tympanitis or hæmatemesis, and the fits preserve a connection with the menstrual type; the spasmodic attacks follow the paroxysms more frequently than in other varieties of the disorder. It is here that the ecstatic condition especially manifests itself, and when insanity occurs it assumes the character of nymphomania.[1] It is reserved for future investigations to show that there is a connection between the local affections of the uterus and epilepsy, such as exists in hysteria.

The next focus of epileptic affections that we have to consider is the gastro-intestinal tract. Irritation proceeding from the intestinal canal and of its glandular apparatus, the former more frequently in children, the latter in adults, acts as a cause of epilepsy; it may be induced by helminthiasis, and especially by lumbricus, less frequently by tænia and ascarides, by catarrh of the stomach and intestines, and by inflammatory affections of the liver.[2] The paroxysms are not unfrequently ushered in by symptoms proceeding from the abdominal nerves; such as pain, tension, and a sensation of cold in the umbilical region, or in the hypochondria, a sense of heat rising upwards from the scrobiculus cordis, nausea, vomiturition, and occasionally dragging pains in the shoulder and the corresponding arm. During the intervals we find indications of intestinal and hepatic disturbance; constipation alternates with diarrhœa, the evacuations are of an abnormal character, there is anorexia and bulimia, icterus appears and disappears with the paroxysms, the abdomen is tympanitic, and presents more or less palpable alterations, there is an abdominal complexion, and the tongue is coated. Little attention has been paid to the etiological relation existing between the kidneys and epilepsy until the most recent period, although the observations of the occurrence of epilepsy after the suppression of dropsical conditions point to this fact, and the influence of the blood dyscrasia in Bright's disease cannot be overlooked. Of all the organic apparatuses, those of circulation and respiration exert the smallest influence in the production of epileptic affections.

---

[1] Consult on this subject—Sinogowitz; über Krampfformen eigenthümlicher Art und deren Verhältniss zu Sexualstörungen bei weiblichen Individuen, in Rust's Magazin für die gesammte Heilkunde, vol. xxiii, p. 195.

[2] Prichard; loc. cit., pp. 251 and 323.

Metastatic processes have been more frequently assumed as causes of epilepsy than proved to be such, as used to be the case when the metastasis of scabies was a favorite subject. There are some indubitable cases on record, however, in which the disease has made its appearance after the removal of long-standing tumours of the surface, after chronic ulcers, whether natural or artificial, have been dried up, and after the disappearance of impetiginous or arthritic affections.

Finally we are forced to the unpleasant confession, that notwithstanding the conscientious investigations of this powerful disease, its causes frequently remain an entire mystery.

Diagnosis and Nosology.—Excepting insanity, there is no disease which is so frequently simulated by recruits, beggars, and vagabonds, as epilepsy, and they often succeed in producing a most perfect counterfeit. In order to discover the deception, medical men have hitherto remained satisfied with deriving the criteria from the paroxysm itself. I am acquainted with none that is so trustworthy as the insusceptibility of the pupil when the sun- or candle-light is thrown upon it, which cannot be imitated by any one. Anæsthesia generally suffices to recognise the cheat, but instances are known of impostors having allowed themselves to be burnt with the actual cautery without evincing any sense of pain: a murderess, who simulated epileptic attacks with the utmost truth, showed Van Swieten and De Haen[1] three cicatrices of burns made on her hand in this way. At the same time we must be careful not to confound the reflex sensibility, which continues even during the paroxysm, with the cessation of cerebral sensibility, and we must guard against mistaking the impression produced by sprinkling where it is expecting a [illegible] to the [illegible], for an act of commiseration. The epileptic subject does not select the place where he will fall, or the supervention of the paroxysm, unless his aura gives him warning; the impostor, on the other hand, takes the proper precautions. It is well known how a cheat of this kind was once discovered in Paris, by setting fire to the straw upon which the impostor fell, which caused him at once to take to his heels. If during an epileptic fit we forcibly unbend the thumbs, which are drawn across the palm of the hand, they remain so till the end of the attack, or close again on the supervention of a fresh convulsion. In case of a pseudo-epileptic seizure, the thumbs are more easily opened, and the subject immediately closes them again, because he considers it an essential feature of the disease.[1] Even the aura is not absent in simulated epilepsy, but the impostor shows his ignorance by indicating an impossible current. Sauvages[2] relates the following instructive case in point: "Puella septennis, epilepsiam simulabat tam apposite, ut nemo in nosocomio generali dolum suspicaretur. Interrogata num sentiret auram ex manu ad humerum, inde ad dorsum et femur, ea annuit; praescripsi usum verberum, quo audito sanata est." The criteria deducible from the period of intermission are not less important: epileptic subjects have a dislike to talk of their disease, they feel ashamed of it, while impostors are in the habit of making a boast of it. There is no simulation of the loss of mental energy or the loss of memory, and the experienced physician will not fail to miss the features in the general habit of the patient, which we have above alluded to.

---

[1] De Haën; Ratio Medendi, p. 135.

It is not sufficient to be on our guard with reference to simulated epilepsy, we must also be aware of the possibility of the disease not becoming patent, of its remaining unknown to the patient himself, or of its being concealed. Nocturnal attacks are apt to remain unobserved; and they may, if of frequent occurrence, induce weakness of memory and loss of the intellectual powers, and occasionally a transitory state of insanity. Small ecchymoses in the eyelids, the cheeks, and at the root of the nose; bites of the tongue, blood-spots on the pillow, lead us to suspect the nature of the case, and our suspicions are confirmed by watching the patient.

---

[1] Marc; in the art. Epilepsie simulée, in Dictionnaire des Sciences Médicales, vol. xii, p. 542.

[2] Nosolog. Method., ed. Daniel, vol. iii, p. 116.

We have already (vol. II, p. 89), alluded to the features by which we distinguish between hysterical convulsions and epileptic seizures.

In a nosological point of view, the division of the subject into idiopathic and sympathetic epilepsy, which has been handed down to us from ancient times, is extremely valuable; we may substitute for this the more correct physiological terminology of a central and centripetal variety. All other divisions only refer to complications or accidental circumstances, and more or less we may apply to them the denunciations which the ancient Greek, in one of the most magnificent productions of medical literature, *Περὶ Νόσου ἁγίου*, has fulminated against those who classified epilepsy theologically according to the screams of the patient, and other accidental trivialities:[1] "For if they imitate a goat, or grind their teeth, or if their right side be convulsed, they say that the mother of the gods is the cause; but if they speak in a sharp or more intense tone, they resemble this state to a horse, and say that Neptune is the cause. Or if any excrement be passed, which is often the case, owing to the violence of the disease, the appellation of Enodias Hecate is adhibited; or if it be passed in smaller and denser masses, like bird's, it is said to be from Apollo Nomius. But if foam be emitted from the mouth and the patient kick with his feet, Mars gets the blame. But terrors which happen during the night, and fevers and delirium, and jumpings out of bed and frightful apparitions, and fleeing away, all these they hold to be the plots of Hecate, and the invasions of the nerves, and use purifications and incantations, and, as appears, make the divinity appear most wicked and most impious."

Our prognosis must, in the first instance, depend upon the duration of epilepsy; every year the resistance to recovery increases; for this reason, that form which has existed from the first year of life is incurable; it is this also which most frequently induces idiocy, and shortens the duration of life. The age of the patient is less material, in point of prognosis, although that form of epilepsy is less favorable which appears in the middle period of life than that which occurs about puberty and in infancy. Among the causes, hereditary predisposition, alarm, and cerebral injury are the most serious. Eccentric causes afford a better prospect, especially when residing in the uterus, the stomach, or in peripheral nerves. When associated with insanity and idiocy, no treatment avails anything.

---

[1] The genuine Works of Hippocrates, translated by Dr. Adams; Sydenham Society's edition, vol. ii, p. 846.

The fatal issue is less frequently brought about in the attack itself than by the agency of other diseases. In the former case, it is generally owing to asphyxia, or the rupture of a vessel, especially in the brain, sometimes also in the lungs and in aneurisms. Of other morbid conditions, we find tubercular phthisis, whether of the lungs or the intestines, the most frequent causes of death in epileptic subjects. Of sixty-two epileptic subjects whose cases have been analysed by Greding,[1] more than half died in this way; nineteen died of pulmonary, and fifteen of intestinal consumption.

Recovery may take place spontaneously, or by the aid of medical interference. A spontaneous cure has been observed to follow the eruption of ulcers, or skin diseases, hæmorrhages, menstruation, intermittent fever, dysentery, arthritis; and what appears peculiarly interesting, the occurrence of amaurosis.[3] It is less usual to find a vicarious relation to other diseases in epilepsy than in mania. We sometimes find the disease arrested during the course of acute complaints, and very often during pregnancy, but we also meet with cases of an opposite character. We had a woman in the clinical wards, who, during five successive pregnancies, laboured under epilepsy, but never in the unimpregnated state. In two other females epilepsy occurred during lactation; it occurred in one during the following lactation, whilst she had been free from it during the interval. Epileptic subjects are rarely attacked with puerperal convulsions. It only occurred twice in fifty-one deliveries of epileptic women.[3] Occasionally the intervals in epilepsy are much protracted, the physician should therefore exercise much caution in prognosticating a permanent recovery.

---

[1] Loc. cit., p. 285.

[2] Esquirol; loc. cit., p. 282.

[3] Tyler Smith; in Lancet, 1849, No. xxiv, p. 644.

A healthy boy became epileptic in his tenth year in consequence of fright, and the fits occurred regularly at the same hour in the evening; after a time they ceased without medical advice, so that the parents ventured to hope that a permanent recovery had taken place. Two years later he was seized with violent pain in the forehead, accompanied with nausea and occasionally with vomiting. While suffering in this way he went skating, and fell on his head; the very same day the epileptic fits returned, and appeared regularly every evening between ten and eleven o'clock, when the boy was going to sleep. In another case which fell under my observation the interval was still longer, but here there was an undoubted hereditary predisposition. The patient had been subject to epilepsy from his sixth to his thirteenth year. The fits gradually disappeared, the individual was able to serve his time in the army, and continued in perfect health until his thirty-third year. About this time, after having remained in abeyance for twenty years, the disease again broke out after a violent vexation, and in this instance it was much more intense than it had ever been before.

In our *treatment* we have to direct our attention to the paroxysm and to the general morbid condition. In the former we have to protect the patient from injury; the floor of his room should be covered with a thick carpet; the bed should be low, to render the falling out during the nocturnal paroxysms less dangerous. It is not always sufficient to introduce a wooden wedge between the teeth to prevent the tongue from being bitten; all tight ligatures encircling the body should be loosened; the fit itself, when it has commenced, should be allowed to take its course; we must give up the idea of interrupting it, for the more complete the paroxysm, especially after a long interval, the more perfect is the euphoria of the patient. If we blame the non-medical friend, who considers the closed thumbs to constitute the essential character of the disease, and therefore thinks to give relief by forcing them open, we must be equally careful to avoid unnecessary interference; under this head we would also class the manipulations of animal magnetism. We must disturb the sleep that follows the fit as little as the convulsions themselves; yet we should be able to recognise the apoplectic sopor, which, though it rarely does so, may supervene.

The radical treatment must, in the first instance, depend upon the indication afforded by the cause. We can achieve least when there is an hereditary predisposition; all we can do is to attend to whatever will aid in preventing the fit. It appears from the quotation of a passage in Paris and Fonblanque's medical jurisprudence by Joseph Frank, that among the ancient Scotch it was customary to perform castration upon epileptic and maniacal subjects, in order to prevent the disease from being conveyed to a new generation. In families in which epilepsy is a pathological heirloom, the intermarriage of the members should be prevented, and the principle of veterinary surgery, of crossing the breeds with good blood, should be followed. The children born of parents with an epileptic taint should be tended with peculiar care. If the mother is liable to the disease, she ought not to nurse her infant, but it should be intrusted to a healthy wet-nurse. During youth intellectual exertion should be avoided; by following out such precautions, epileptic subjects have been trained to become the rulers of nations.

Causes of epilepsy residing in peripheral nerve-tracts have been occasionally removed with permanent success by an operative proceeding; neuromatous growths may be excised, as recommended by Carron, Short, and Maisonneuve; adhesions of nervous filaments and dragging cicatrices may be treated by cauterisation. It has been advised in this case to maintain suppuration in the part for a considerable time. Dieffenbach[1] has communicated the case of a young girl, who some years previously had cut her hand by falling upon a broken bottle. Violent neuralgic pains; epileptic seizures; contraction with complete emaciation and entire uselessness of the limb resulted. The fingers had partly become contracted from spasms and partly by hard cicatrices. On excising the cicatrices a small splinter of glass resembling a fine fish scale was discovered; it had divided a nerve, which at this point was indurated, and enlarged. After the operation the neuralgia, the epilepsy, the contraction, and emaciation of the limb disappeared; the patient recovered entirely, and regained the full use of her limb. We may also briefly quote an observation by

---

[1] Die Operative Chirurgie, vol. i, p. 852.

Joseph Frank.[1] A young man, aged 23, who had always enjoyed good health, received a cut of a whip across his scrotum while asleep. The inflammation of the scrotum and the retention of urine that followed were removed, but repeated seminal discharges, which previously had been very rare, took place every night. For this affection cold baths were ordered. In the sixth bath the patient was seized with violent convulsions, which returned daily. After this the discharges ceased. Eight months later the young man was admitted into the clinical ward of Dr. Frank. Paroxysms that varied in duration returned almost weekly; after each fit the testicles were drawn up; the left epididymis was excessively tender. Dr. Frank advised castration, which was performed, and though the testicles presented no morbid appearances the epileptic fits did not return, and eleven years later the patient was still found to continue free from epileptic seizures.

Under these circumstances we may be allowed to expect some success from interrupting the precursory aura by ligature, compression, friction, extension of the limbs, &c. It is necessary always to direct our attention to the cranial bones, and examine them as to the existence of any lesion, whether the result of dyscrasia or injury; it is absolutely necessary to make a careful exploration of the head, which is only too often neglected. These cases are the triumphs of surgery. Travers[2] relates the case of an epileptic boy in St. Thomas's Hospital in London, whose cranium presented a depression, which was tender on pressure. The trephine was applied, and the concave portion removed; on raising it a violent epileptic fit occurred, but it was the last. From the inner lamella an osseous spicula projected about an inch in length, which compressed the dura mater. Good results have also been obtained by crucial incisions into the integuments, and by keeping a large fontanelle open for a length of time. In syphilitic nodes Larrey strongly recommends the combination of the local treatment by blisters with a mercurial course.

We will only make a few remarks on the treatment of those forms of epilepsy which are caused by morbid conditions of other organs, in order to avoid the repetition of well-known varied in frequency, but were tolerably regular, generally 80 in the minute, like the pulse. Every time that the patient became heated and fatigued they increased in frequency and intensity. The beat of the carotids was full and strong, and these arteries were themselves unusually dilated. The patient complained of a tension and pain in the head, and cold in the feet. The bowels were sluggish, and the urine more or less pale. Parry predicts that pressure upon the right carotid would remove this attack, but that it would not be influenced by compressing the left; and this proved to be the case every time that pressure was applied. These experiments were subsequently repeated in London by Dr. Baillie, with the same result. In 1786 Parry had a patient under his care who suffered from repeated attacks of violent headache, delirium, and convulsions, the latter were so violent that it required three men to hold her. On applying pressure to one or both carotids all convulsive symptoms at once ceased. Mere pressure upon the skin was not the cause of this effect, for if any other part of the skin was touched but the carotids no result followed. Parry assures us that he has succeeded, in the course of twenty years, in curing a number of cerebral affections, which had resisted other modes of treatment, by this compression of the carotids; he recommends it to be performed by pressing the thumb on a level with the superior border of the cricoid cartilage against the vertebræ. The same writer communicates some instructive remarks on the pulse in the carotids in nervous diseases, and on their dilatation as a predisposing element, which are the more deserving of our attention, as they come from a person[1] who is so thoroughly acquainted with the arterial pulse.

---

[1] Praxeos Medicæ Universæ Præcepta, vol. i, p. 476.

[2] A further Inquiry, &c., p. 285.

I have repeated the experiment of compressing the carotids, and have found the proceeding to be an effectual prophylactic if employed in patients who have forewarnings of their attacks, and are able to apply it in time. An architect, 28 years of age, by this means was enabled to prevent the epileptic paroxysm whenever he was seized with vertigo, and when he took leave of me he had thus staved it off for six months. But it is not every patient who has the intelligence and the strength to make the experiment with his own hand; and we do not as yet possess a suitable compressorium, which might be applied several times daily, even when there are no premonitory symptoms, in order to diminish the current of blood to the head. The instrument which my former pupil, Dr. Lewis, has figured in his dissertation[1] is too complicated to answer the purpose well. At all events, the compression of the carotids and the regulation of the respiratory movements present us with a means by which we may more directly influence the brain than with any other. We have already drawn attention to the manner in which respiratory movements may be employed for the purposes of diagnosis.[2] The case described at vol. II, p. 117, shows that deep inspirations may prevent the outbreak of convulsions; we may equally, therefore, expect benefit from the proper employment of compression.

---

[1] Consult—Memoirs of the Medical Society of London, 1792, vol. iii; and Philosophical Transactions for the year 1811, part i, p. 89.

Anæmia more frequently demands our consideration in the treatment of epilepsy than plethora, more especially in the female sex, in whom it is often associated with disturbance of the uterine functions. In the month of December, in 1847, a girl of 15 was under treatment at the Policlinique, who had formerly enjoyed excellent health, and had eight weeks previously been seized with her first attack of epilepsy. A fortnight before applying for relief a second fit had occurred, lasting half an hour, and preceded by violent gastrodynia. For several months the catamenia recurred every fortnight, and continued profuse for from three to four days; the complexion was excessively pale; on the 3d and 9th of January there was a return of the paroxysms. In order to diminish and to regulate the menstrual discharge, I ordered an infusion of sabina, (two drachms to four ounces, taken four times a day,) which I found on previous occasions to produce excellent effects. After an interval of five days the usual aura occurred, followed by a paroxysm which only lasted five minutes, and after an interval of three weeks more the courses reappeared. On the 26th of February the patient was in admirable health; the attacks had remained in entire abeyance for three weeks; after an interval of three weeks and a half the catamenia had recurred regularly, and much less profusely than formerly, and all medicines were omitted. A year later the young woman's health was found to have continued undisturbed. Although the connection existing between local diseases of the uterus and epilepsy has not been actually demonstrated, as in hysterical affections, attention will in future be drawn to the subject, and, if found to exist, the treatment recommended at vol. II, p. 90, seq., will have to be employed.

---

[1] De compressione Arteriarum ad complures Morbos sanandos utilissima; Berolini, 1846.

[2] Vol. I, p. 159.

For the treatment of epilepsy depending upon morbid conditions of the liver and the biliary secretions, the springs of Marienbad and Carlsbad,[1] followed by the use of sea baths, are advisable. A young man residing in England had, in consequence of too copious animal diet and absence of exercise, been attacked by the disease, which was at once treated with specifics like nitrate of silver, &c., and only made the deeper inroads. An icteric hue of the face, the phantasm of a yellow spot before the right eye, and vertigo, were the precursors of the attack. The left lobe of the liver was swollen and sensitive to the touch; there was obstinate constipation; the urine was high coloured; the fæces of a brown hue. I advised drinking the waters of Marienbad for three successive years, for four weeks each time; cold washing of the head and trunk; the cold water cure; and, subsequently, the baths; the result was most satisfactory, and it is now eight years since the least trace of the disease has been manifested. Constipation is a symptom peculiar to epileptics, and deserves our especial attention; it very often gives rise to an abuse of drastic remedies. In these cases, cold water enemata are particularly beneficial; and if they do not produce a sufficiently powerful effect, injections of tepid or cold water should be made into the rectum to the amount of from half a quart to a whole one; this serves as a sort of internal bath, which has not been sufficiently apprecited hitherto in the treatment of obstinate and severe nervous diseases.

---

[1] [Marienbad and Carlsbad baths, situated in the great volcanic plain of Bohemia, and in great request among the Germans, both belong to the class of mineral waters, the main constituent of which is sulphate of soda; they also contain carbonates of soda and lime, and of some earths, carbonic acid gas, and a minute proportion of iron. They are powerful solvents and purgatives, acting specifically on the lymphatic and urinary organs. The waters of Carlsbad are much more heating and stimulant than those of Marienbad, and if used without proper precautions may produce dangerous effects.]—Ed.

If the choice of our therapeutic proceeding is made with a due regard to the relation that may exist between an interruption of cutaneous affections and epilepsy, it is often crowned with remarkable success. A man of 45 years, who was a patient of the Policlinique, had suffered from scabies in his early youth, from which he had rapidly recovered. For seven years previous to coming under my care he had suffered from epileptic attacks, which at first occurred only during sleep, but afterwards also supervened during the waking state, and induced great weakness of memory. The statement of the patient that from time to time a papular eruption occurred on his body, which, when fully developed, diminished the frequency and intensity of the epileptic attacks in a marked manner, particularly attracted attention; and in accordance with this hint from nature, a bath of sulphuret of potash and friction of several parts of the body with a liniment containing castor oil was ordered. Internally a remedy, much lauded by the older physicians in similar cases, the tinctura Jacobi, (liquor saponis stibiati,)[1] was administered, and continued in increasing doses from fifteeen to twenty-five and thirty drops, for a considerable time. The treatment was effectual; for the attacks which formerly returned almost every fortnight, have since disappeared, and it is now more than a year since they have shown themselves.

The second indication for the radical treatment is to restore the nervous system of the individual to its normal condition. We must strive to solve this problem in those cases in which no cause is to be discovered, as well as in those in which, after removing the exciting cause, the disease yet continues. Our chief guide must be the pitch of the irritability. If the character of the nervous system we have to deal with is one of erethism, and especially in the female sex, and in infancy, a milk and vegetable diet should be recommended. Cheyne[2] relates the case of a celebrated physician, who himself suffered from epilepsy for a considerable time, and used numerous remedies without benefit. As he perceived that the attacks occurred the less frequently the fewer and the more digestible articles of food he consumed, he confined himself entirely to milk; he took a pint of milk in the morning, another in the evening, and two in the middle of the day; taking nothing besides but water. He continued this diet for fourteen years, and entirely recovered from his epileptic attacks, an instance of abstemiousness which is not often to be met with among our professional brethren. If there is great erethism we may also use the grape cure. On the other hand, if we have to deal with a torpid subject, he requires to be roused by stimuli, which act upon the central organs and the peripheral distributions of the nerves. Our sheet anchor in these cases are cold baths, plunging and shower baths. If it were in our power to limit the effect of powerful mental emotions, and especially of fright, we should be more successful in our treatment of these varieties of epilepsy. The older authors recommended, upon this principle, to let the patient see the execution of criminals, and drink the warm blood of the malefactor. A powerful derivative should be applied in the vicinity of the head, at the occiput, or near the first cervical vertebra; the most suitable means of doing so is a seton, and it is most important that the suppuration should be kept up for a series of years. I have repeatedly found the physical and intellectual condition of the patient improved by its use, the frequency of the paroxysms diminished, and even in a few instances a permanent cure obtained. Among these I may mention the case of a boy of 11 years, who had been subject to epilepsy, accompanied by slight paralysis of the right extremities and dementia, for a year, in consequence of which his schoolmaster insisted upon his removal from the school. Many remedies had already been applied in vain. The cranial bones were found much hypertrophied. As a scrofulous habit existed, the iodide of iron, gradually increased from one sixth to one half of a grain, was given twice a day, and a seton introduced in the nape of the neck. An improvement was perceptible after a few weeks; the paralysis had ceased after six months; the intellect developed itself, and the epileptic attacks did not return. Two years later the boy was presented to the students of the Policlinique, in the full enjoyment of his health.

---

[1] [Sapo stibiatus is a soap containing the golden sulphuret of antimony, which, when dissolved in caustic potash and cinnamon water, forms the tinctura Jacobi.]—Ed.

[2] Essay on Gout; London, 1724, p. 103.

As regards the remedies, much perseverance and judgment is required. Fifty-three years ago they had already accumulated to such an extent as to fill 150 quarto pages in Hemmings' 'Analecta Literaria Epilepsiam Spectantia;' they have since been considerably augmented. Among this farrago there are but very few to which the practitioner of experience turns with confidence. Among the vegetal drugs, the Valeriana Officinalis, which has been spoken of by Aretæus and Dioscorides, is to be recommended. It is not a little in favour of the remedy, that the man who reintroduced its use, the Neapolitan Fabius Columna,[1] was himself cured by it. The most suitable form is the recently-prepared powder of the root of a plant, growing in elevated spots, taken in doses of from half a drachm to three drachms daily. Among the metallic preparations we have chiefly to mention the nitrate of silver, for the virtues of which I am able to quote the high authority of the late Dr. Heim, who has assured us that he found it the most effectual remedy during the course of a professional life of sixty years. The renewed exhibition of nitrate of silver in epilepsy, (it was originally recommended by Angelus Sala at the commencement of the seventeenth century,) was introduced by British physicians, Wilson, Harrison and Paget; they use larger doses than are customary in Germany, and have found doses to the amount of one, two, three, and even six grains, given in pills, three times a day, to produce satisfactory results.[2] Powell has found that the stomach bears a threetimes larger dose in the solid than in the fluid form.[3] It is advisable to begin with small doses of a quarter of a grain, to increase the quantity gradually, and persevere with it. The blue discoloration of the skin, to which the late Dr. Albers of Bremen and Dr. Roget were the first to direct attention, bears no relation to epilepsy.[4] The ammonio-sulphate of copper and the sulphate of zinc are less efficacious, though of late the sulphate of zinc has been recommended as effectual by Drs. Bright and Addison,[1] if given in doses, gradually increased to a scruple and half a drachm, three times a day.

---

[1] Phytobasanos. Neapol., 1492.

[2] John Cooke; History and Method of Cure of the various species of Epilepsy; London, 1823, p. 142.

[3] Medico-Chirurgical Transactions, vol. iv, p. 85.

[4] Ibid., vol. vii, p. 220.

Therapeutic attempts will fail unless supported by a strict mental and bodily regimen.[2] The strongest proof of the influence of mental dietetics is given in the fact, that even in inveterate epilepsy the hopes excited by a change of the physician and of treatment may prolong the intervals between the fits, and even give rise to a pause. Esquirol[3] states the same, in the following terms:—Toujours une nouvelle médication suspendait les accès pendant quinze jours chez les uns, pendant un mois, deux mois chez d'autres, et même pendant trois mois.

---

[1] Observations on Epilepsy,—in Guy's Hospital Reports, vol. vi, p. 17.

[2] Consult Diætophilus; Physische und Psychische Geschichte seiner siebenjährigen Epilepsie; Zürich, 1798.

[3] Loc. cit., p. 319.

CHAPTER XXXIII.

TREMORS.

THAT neurosis of motility, which goes by the name of tremors or trembling, forms, as it were, the bridge which conducts from the region of convulsions to the paralyses. On this subject Volkmann[1] makes the following remarks:—"Henle has already adopted the view of muscular tonicity, being a state of continuous and moderate excitement. That this excitement depends upon a continuous succession of stimuli, is proved by the fact that we are able to restore the tone of a muscle which has been lost in consequence of the division of its nerve, by a very rapid succession of stimuli. This is effected by exposing the divided motor nerve to a very weak current of the magneto-electric rotatory apparatus. The stimuli follow one another so rapidly, if the wheel is turned round with sufficient rapidity, that the operation of the second commences before that of the first has entirely ceased. The motor impulses of the spinal cord must take place with at least the same rapidity, in order to produce the constant contraction, which we call tone. If the stimuli do not follow one another with sufficient rapidity, the muscle has time to relax, and this is probably the explanation of the tremor of old age. We are, in fact, able to produce the tremor artificially, if we place the spinal cord of a decapitated animal in connection with the weak current of a magneto-electric apparatus, and make the revolutions rather slower."

Tremulous movements of muscular organs take place with varying force and intensity, they not unfrequently follow each other with a certain rhythm, and with great rapidity; there is an arrest of the affection during sleep, and while the parts are supported; it is increased by voluntary movements and emotions, while the motor force and endurance are at the same time diminished. The muscles of the extremities of the trunk and of the cervix and tongue are the most frequent seat of tremor, which is either limited to individual groups, or involves several at once. Nystagmus, for instance, is generally nothing but a tremulousness confined to the recti externi and interni, and in the muscle of the lower eye-lid we not unfrequently have opportunities of observing the tremor of individual layers of muscle.

---

[1] Wagner's Handwörterbuch der Physiologie, Art. Nervenphysiologie, p. 488.

Complications with other morbid conditions of the nervous system occur frequently, with insanity in delirium tremens, with an abnormal balance of movements in paralysis agitans, and with a loss of the cerebral conducting power of motor nerves in paralysis.

Advanced age affords a predisposition. Mercurial vapour is a specific cause of the affection, poisoning with lead acts less frequently; it is also induced by alcohol, and venereal excesses and masturbation. Fevers, mental emotions, and debility during the period of convalescence and after profuse discharges, act as occasional causes.

MERCURIAL TREMOR.

This disease[1] rarely commences suddenly, but generally by degrees; first seizing the arms, then the legs, and at last the tongue, both in its masticatory and articulating functions. The shaking and trembling, especially if the causes continue to operate, degenerate into violent shocks, which interrupt and prevent the execution of voluntary movements. If a patient of this description desires to bend his arm, he finds himself unable to do so at once, but succeeds by making two or three pauses; if he attempts to drink, he spills the beverage; he is unable to introduce the food into his mouth, and requires to be fed like a child.[2] The speech becomes indistinct and thick; the tremor is increased by emotions; the complexion has a grey hue; the skin is dry and rather hot; emaciation occurs rarely; the abdomen is soft; the evacuations unaltered; much flatus accumulates in the intestines, and is discharged upwards and downwards; there is loss of appetite; and the pulse resembles the pulse of lead colic, being hard and slow.

---

[1] Tanquerel des Planches; Traité des Maladies de Plomb ou Saturnines; Paris, 1839, vol. ii, p. 33.

[2] See—Mérat; sur le Tremblement auquel sont sujets les doreurs sur Métaux, et les autres ouvriers qui comme eux emploient le Mercure, in his Traité sur la Colique Métallique; Paris, 1812, p. 273.

The disease generally lasts a long time. A perfect cure is rarely established; a slight tremor generally remains; a complication with other diseases is very rare, and the issue is scarcely ever fatal.

The malady is produced by mercurial vapour volatilised at the ordinary temperature of the atmosphere; its action is still more violent if volatilised by fire. Faraday states that a plate of gold attached to the mouth of a bottle, upon the bottom of which there is a small quantity of mercury, speedily becomes covered with amalgam.[1] Gilders and workmen in quicksilver mines are, therefore, most exposed to the disease; then the manufacturers of looking-glasses, meteorological instruments, jewellers, and brassfounders. The external and internal administration of mercury, only in exceptional cases, produces such effects; on the other hand, mercurial tremor is rarely accompanied by salivation.

The prophylactic measures against mercurial tremor have been rendered much more secure since Darcet introduced the blast-furnaces into bronze and other manufactories. Fresh air and cleanliness are protectives; and the workman should be cautioned to avert his face as much as possible from the vapour during his work. When the disease has actually appeared, the chief condition for recovery is the avoidance of the cause; the individual must give up his employment for a time, or for ever. Dr. Haen[2] found the most positive benefit in the employment of electricity; he has communicated nine cases in which a cure was obtained without any other adjunct. Country air, warm baths, opium and decoction of sarsaparilla, are recommended by Mérat. Sulphur taken internally and used in baths is also advisable, as well as the salts of iron and quinine.

TREMOR POTATORUM.

In drunkards, the head, tongue, and lips, are most liable to tremor; the movement is strongest and almost convulsive when they wake up, or when they are sober. Attempts at treatment almost invariably fail, from the inability of the patients to resist the temptation to resume their bad habits.

---

[1] Christison; A Treatise on Poisons, 3d ed., p. 391.

[2] Ratio Medendi, vol. iii, p. 201.

TREMOR SENILIS.

Besides the extremities, it is chiefly the head, which in aged people is subject to the tremor, and females are more liable to it than men.

TREMOR FEBRILIS.

In febricitations and rigors, especially of intermittent fevers, besides the muscles of the trunk and the extremities, those also of the masticating muscles tremble. According to Magendie's[1] experiments, the withdrawal of the subarachnoid fluid of the spinal cord in living animals, and its reinjection at a lower temperature, produce similar trembling and agitation.

PARALYSIS AGITANS.[2]

Dr. Todd[3] describes the disease in the following terms:

"The disease approaches gradually and almost imperceptibly, generally commencing with a sense of weakness and slight tremor of the hands and arms, and occasionally of the head. After a lengthened period, perhaps a year, the patient loses his balance in walking, and bends forwards. The feet are powerless and tremble. The tremor becomes permanent, overpowering, and does not even cease when the parts are firmly supported. Head, hands, and feet, are in constant tremulous movement. When the patient attempts to walk, he throws himself upon the toes and front of the foot, walks hastily and insecurely, in constant danger of falling on his face. The tremor now continues during sleep, and becomes so violent that the bedstead shakes, and the patient wakes up. He is unable to read or to write, and being unable to eat by himself, requires to be fed. Mastication is difficult, the saliva flows to his having been plundered of his clothes by the Cossacks, in 1813, before Magdeburg, when in a state of perspiration, and left lying on the damp ground for several hours. The second patient had, a year previously, suffered from a quartan ague, which was rapidly suppressed, and was then followed by paralysis agitans. In the third case, the cause could not be accurately determined. The patient who, thirty years previously, had passed through a nervous fever, stated that she had several times been attacked by paralysis of the right side, from which the warm springs of Teplitz had restored her. It is impossible to determine whether these circumstances and eleven confinements, and a life worn out by anxiety and care, presented an etiological relation to the paralysis agitans. I may mention, that this was the only case in which the treatment, which consisted in warm baths, with cold affusion to the head and neck, and in the use of the carbonate of iron, produced, if not a complete cure, a marked diminution of the symptoms. In one case, Elliotson obtained a cure by the persevering use of the carbonate of iron.[1]

---

[1] Leçons sur les Fonctions et les Maladies du Système Nerveux, vol. i, p. 111.

[2] Parkinson; Essay on the Shaking Palsy; London, 1817.

[3] Cyclopædia of Practical Medicine, art. Paralysis, p. 259.

---

[1] Behrend; Neuste Medic. Journalistik des Auslandes, Band xi, p. 309.

DISEASES OF THE NERVOUS SYSTEM.

CLASS II.

THE DOCTRINE OF THE NEUROSES OF MOTILITY.

SECTION THE SECOND.

CHAPTER XXXIV.

ACINESES.[1]

PARALYSIS.

THE definition of paralysis is, weakness or cessation of muscular contraction by diminution or loss of the conducting power or stimulation of the motor nerve.

This gives us the means of distinguishing paralysis from every other immobility of the muscle, with which it is often confounded. I shall not enter into a consideration of that variety of immobility which arises from disorganisation of the muscular and fibrous tissue and from other morbid processes; but I deem it necessary to dwell upon those varieties of immobility which originate in an absence of the normal stimuli of the muscular fibre.

At an earlier part of the work I have had occasion to speak of the arterial blood as the stimulus of contractility, the inherent power of the muscular fibre; and I pointed out that the prevailing energy of the nervous stimulus may be manifested even after the blood-stimulus has ceased to operate. I brought forward as proofs experiments made upon living animals and the asphyxia of cholera. This relation, however, only maintains for a brief space; when the conveyance of arterial blood is arrested for a length of time, and is not replaced by collateral circulation, the loss of contractility is as certain to follow as when the conduction of the motor nerves is interrupted. The cases of arteritis recently described prove this clearly; the following is one which has occurred in my own practice:

---

[1] See Editor's note, vol. I, p. 275.

A merchant, aged 29, who generally enjoyed good health, and had lately engaged himself to be married, after an indisposition of a few days, suddenly, in the night of the 20th and 21st of October, 1844, complained of a burning sensation in the lower extremities, which rose upwards towards the head, where it was converted into an overpowering sensation of hissing and boiling; he was almost deprived of consciousness, but he was just able to call for assistance. The physician who was sent for found him with a livid, bloated countenance, and speechless; the left side was almost deprived of motion, the head was confused, and the pulse slow; when the patient was raised, vomiting supervened. A venesection was made, and antiphlogistic treatment adopted. Speech returned on the evening of the same day; only a trifling pain in the head remained, which was increased by movement. On the following days the pulse was accelerated and the skin hot and dry. The patient complained of formication in the fingers and sleeplessness. On the 1st of November, a rigor, followed by heat and perspiration, supervened; and this returned, at irregular times, once or twice daily, and also at night. The urine varied; sometimes it was clear and pale, at others deep-coloured and turbid. On the 4th of November the right foot presented a sense of numbness, which passed off after a few hours under the application of dry friction, but returned on the following day, extending to the middle of the calf, and being associated with coldness, anæsthesia, and difficulty and pain in movement. Dull pains also occurred spontaneously in the deeper-seated parts of the limb. On the 12th of November the warmth and sensibility of the limb were gradually restored, but the foot was dragged in walking; the fever continued and the powers were reduced. The patient now also complained of a sense of tension in the left foot, and of a deep-seated dull pain, which was increased by pressure upon the internal surface of the thigh, and became very violent on the 14th of the same month. The rigors had left him for a few days, but the fever had risen; sleep was altogether in abeyance, and gave place to delirium. The urine often passed off involuntarily, although the patient felt a desire to micturate. On the succeeding days violent palpitations of the heart supervened.

On the 28th of November I was called in to consultation on the case. The left foot and leg were considerably œdematous; pressure of the finger upon the dorsum of the foot left indentations of a blueish red colour. Extensive dark sugillation was found on the external side of the calf. The skin of the sole of the foot was of a dark yellow colour, and towards the toes thrown into thick folds, as we find it in Asiatic cholera. The temperature was much reduced to above the knee. Sensibility was entirely gone, and I was able to insert a needle to a considerable depth without the patient perceiving it, and without discharging a drop of blood. The leg was paralysed, and it was only after repeated requests that the patient bent the large and adjoining toes, and, by moving the thigh, slightly rotated the whole extremity. The normal colour and temperature of the body commenced above the knee. No pulsation was to be felt either in the popliteal or crural artery of the left side; pressure upon the femoral, just below Poupart's ligament, excited violent pain. By the aid of the stethoscope I was enabled to hear pulsation above the navel, but none below. The pulse was also imperceptible in the left radial. No difference was observed in the temperature and sensibility of the arm and hand of the opposite side; but the motor power had suffered, and the patient himself complained of weakness in the limb. The pulsation of the left carotid was less than that of the right. The right leg, which was bent at the knee, presented a moderate warmth. Sensibility was very obtuse, so that the patient was unconscious of contact unless he saw it. Motility was impeded, though not to such an extent as in the left foot. The crural artery pulsated; at the popliteal, pulsation was not to be distinctly discerned. The impulse of the heart was accelerated and strong; a distinct vibration was communicated to the hand. The first sound of the heart was marked by a loud bellows-murmur, which was synchronous with the pulse. The pulse was 120, and compressible; the skin dry and warm; respiration somewhat accelerated, without a sense of dyspnœa; the patient lay equally well on his sides or his back; the bowels had not been moved for twelve hours; the abdomen was tympanitic, giving a hollow sound on percussion; the urine was copious, often passing off involuntarily; the tongue moist, thirst moderate, and the face sunken and pale, the lips especially so. Consciousness proved to be unembarrassed in conversation, but the patient had no perception of his disease; on the contrary, he enjoyed a certain euphoria, and fell into pleasing deliria as soon as he was left to himself.

I explained to the medical gentlemen attending the case that I could not adopt their view as to the disease being an affection of the spinal cord, but that I attributed the paralysis of the inferior extremities to the impermeability of the crural artery and its ramifications, which, at the patient's time of life, if no aneurism is present, can only originate in inflammation, arteritis. Cerebral and spinal paralyses do not commence with disturbance of the circulation; neither this symptom nor the diminution of temperature attain so high a degree in paralysis, nor is there ever an entire absence of pulse in the vascular trunks. In the present instance I apprehended the approach of mortification, resembling gangrena senilis. Judging from the report given me, I considered that the disease had commenced in the right femoral artery, but without blocking up all the collateral branches, as warmth had been restored; that it had extended upwards to the bifurcation of the aorta, from whence it had spread to the left iliac and crural arteries, in which its greater extension had interrupted the circulation entirely. The vivid pain on compressing the femoral artery under the crural arch appeared to me to indicate a continuance of the inflammatory process as a condition of the obliteration. But disease of the arterial system had evidently extended above the diaphragm, and affected the left side of the body; a morbid change in the left side of the heart, in the mitral valve, was indicated by the bellows-murmur, the increased impulse, and the vibration, probably arising from endocarditis;

and it was evident that in the radial artery a similar process to that existing in the crural artery, though less marked and not affecting the collateral circulation, had been established. I stated that the fatal issue was unavoidable, both from the extent of the arteritis, as also because the heart was much implicated, and the vital powers were failing, so that we could not expect the formation of a collateral circulation after the obliteration of the main trunks. I therefore argued that we could no longer think of employing a reducing mode of treatment, and advised the application of aromatic fomentations to the lower extremities, friction with grey ointment to the thighs, and the exhibition of broth and wine.

November the 29th.—During the night there had been silent delirium and a cold perspiration. A dark red ecchymosis is visible on the right knee, the œdema of the left foot is diminished and softer. As far as the warm fomentations have been applied, a communicated warmth is found, ceasing at the knee, the temperature of which is cool. The pulse is 128, small and irregular, the skin moist and moderately warm. The tongue dry at the tip and down the middle. Consciousness untroubled. Urine and excrements pass off involuntarily, but the patient always feels the desire to micturate. The position of the body is on the right side, and a change of posture is impossible without the assistance of the attendant. The right leg is bent at the knee.

November the 30th.—The right leg is painful when moved; when at rest the patient complains of painful tension in the limb, although there is complete anæsthesia to external irritation. The epidermis is desquamating at several spots, also on those that are ecchymosed. An ecchymosis has formed on the left knee, extending to the middle of the thigh, which is now also cool and deprived of sensation as far as the edge of the glutæi. There is incipient decubitus at the sacrum. The bellows murmur in the heart continues. The tympanitic distension of the abdomen has increased, in spite of three watery alvine discharges. In the course of the day he was frequently delirious. A decoction of bark with acetic ether and warm fomentations to the legs with vinegar, were prescribed.

December the 1st.—During the night the delirium has con-the tongue is dry, covered with aphthæ at the tip and the edges, and deglutition is impeded. The pulse of the left radial is imperceptible; and the bellows murmur in the heart has ceased. The congestion of the veins has extended up to the thigh; they form a network of broad dark brown striæ, which are also perceptible to the touch; the saphena magna is particularly prominent. The ecchymosis, which covers the entire inner surface, has assumed a darker hue. Several blisters have formed on the leg. The right leg has become more emaciated; the mummified portion has extended, and the surrounding skin presents a dark purple colour. The sensibility of the right thigh generally is much reduced, but at the same time pressure upon the crural artery causes much pain.

December the 5th.—The patient is more collected, but his articulation is thick and unintelligible. The respiration is very quick and short; the pulse 124. The urine, which has been caught up by the attendant, is copious, clear, and slightly acid. The gangrene is extending rapidly. The epidermis is peeling off from the left leg; the exposed cutis is as black as a coal and pulpy, the muscular tissue has passed into fetid putrefaction. Large and profound sphacelation has formed on the leg and heel. An extensive gangrenous spot has appeared on the dorsum of the right foot; the epidermis is detached, and the subjacent cutis is black, horny, and corrugated. Sopor ensued, and at four o'olock on the ensuing morning death terminated the scene.

The cadaveric examination was conducted, thirty hours after death, by Professor Froriep. The cavities of the pleura contained a small quantity of a reddish-coloured serum. With the exception of the cadaveric stasis in the lower lobes, both lungs were perfectly healthy. The pericardium was much distended, and filled with from five to six ounces of fluid. The heart was enlarged, and the left ventricle hypertrophied. A pale red firm coagulum was found in the right ventricle; a larger coagulum was found in the left, and it contained more cruor. A rounded excrescence lay between the two flaps of the mitral valve, attached to the upper one, an inch and a half in length and of a yellowish colour, almost blocking up the auriculo-ventricular orifice. The aortic valves and the inner surface of the ventricle were normal. In the arch of the surrounding it, which was much inflamed. The crural and common iliac veins were normal.

A firm pale red plug, intimately adherent to the inner coat, was found in the brachial artery, immediately above its division into the radial and ulnar, extending about half an inch into each branch. These were narrow, and their inner coat was somewhat rough and reddened. The radial contained no coagulum in the remainder of its course. The left subclavian and carotid arteries were normal.

Forty-eight hours after the post-mortem, Professor Müller had the kindness to accede to my request, to examine the heart and the arteries more minutely.

The section of the tumour at the mitral valve exhibited a fibrous structure, and proved under the microscope to be made up of fibres of cellular tissue. It was seated beneath the endocardium, which extended from the auricle over the tumour into the ventricle. The yellowish-white coagulum in the lower portion of the right crural artery was impregnated with a fluid of the same colour, in which the microscope showed numerous corpuscles, which, however, did not correspond to pus globules. A thin layer of plastic lymph covered the arterial coagula, which in many parts also invested the inner coats of the arteries. The internal coat of the arteries had become darker than it was on the day of the post-mortem; it was extensively detached from the middle coat, and in some parts a distinct layer of lymph was found between them.

The causes of this mighty disease are enveloped in obscurity: no violent fatigue, no excess of any kind had preceded; it was equally impossible to show the presence of any dyscrasia. After the death of the patient his brother informed me that since his engagement a remarkable psychical change had taken place in him. Formerly he had been phlegmatic and indolent; he had since become animated and excited, and had sat up whole nights writing letters and verses to his betrothed. The same subject had frequently and earnestly occupied him while on the bed of sickness. We can only form a conjecture as to the commencement of the disease, as we do not possess an accurate history of its early stages. The co-existence of the disease in the central organ of the circulation and in several arteries is an essential feature. Still the existence of in some places there was a firm plug of a pale red colour adhering to the lining membrane, and completely occluding the calibre of the artery; in others, there was a thinner coagulum, containing cruor, and easily detached; on the left side the external iliac and all of its branches were blocked up in this way, the right iliac being free. 4. The right femoral, in which the inflammation commenced, showed a tendency to obliteration; it was narrowly contracted, and the inner coat corrugated. 5. The cellular tissue in the vicinity of the arteries, *e. g.* under Poupart's ligament, was much inflamed, and the lymphatic glands situated there were found reddened and swollen. I mention the reddening last, as it may be explained away as the result of imbibition; still the fact that it was not uniform, but only partial, and that it was more intense seventy-two hours after death than on the day of the sectio cadaveris, endues it with a special value. The implication of the left saphena explains the difference in the character of the gangrene; it was moist and œdematous in the left; dry (mummification) in the right lower extremity.

The symptoms during life indicated an impediment to the current of the arterial blood caused by arteritis, for which there was no supplementary action by the collateral circulation; it was marked on the one hand by a stony coldness, lividity, pulselessness in the arterial trunk, and tenderness of the same on pressure; on the other, by anæsthesia and paralysis. This combination of phenomena, which showed the impairment of the two great supporters of vital action, was apparent from the beginning, and should challenge us to make accurate investigations, in order to prevent our confounding the disease under consideration with spinal and cerebral paralysis.

In horses an inflammation of the femoral arteries and abdominal aorta has also been repeatedly observed[1] and diagnosed even during life. The symptoms are:—at first weakness of one or both hind legs when hard worked, while no difference is perceptible when the animal is at rest, in walking, or trotting. If the attempt is made to force the animal to go on, it manifests great anxiety, breaks out into profuse perspiration, and only the lower part of the back and the hind legs remain

---

[1] Gurl's und Hertwig's Magazin für die gesammte Thier-heilkunde, 4 Jahrgang, 1838, p. 455; 9 Jahrgang, 1843, pp. 221, 461.

[illegible] experimen[illegible]
[illegible] the ligatu[illegible]
[illegible] for the purpose
[illegible] an[illegible]
[illegible] until th[illegible]
[illegible] paralysis of the hind leg
[illegible] has been observed
[illegible] The question suggests itse[illegible]
[illegible] directly up[illegible]
[illegible] The cutaneo[illegible]
[illegible] paralysis would seem to sp[illegible]
[illegible] accompanying arteri[illegible]
[illegible] substances into the cru[illegible]
[illegible] In these experiments Cruveilh[illegible]
[illegible] was not complete
[illegible] of violent pain and w[illegible]
[illegible] symptoms ceased after the co[illegible]
[illegible] anaesthesia and paralys[illegible]
[illegible] of moderate movement a[illegible]
[illegible] in spite of the obliteration
[illegible] absence of arterial blood, as
[illegible] fibres is the cause of t[illegible]
[illegible]

The preceding facts and remarks show the necessity of paying close attention to the condition of the arterial circulation in paralytic affections. From this we may expect an advance, not only in point of diagnosis, but also in therapeutics; and the arteritis, which has been much neglected hitherto, in comparison with the allied disease phlebitis, will receive its proper place in pathology. Nor is it uninteresting to find that the same materia peccans is capable of producing arteritis with gangrene, convulsions, anæsthesia, and paralysis. The poisonous influence of secale cornutum has manifested itself under the first form as ergotism in some provinces of France and Switzerland, in the second form as the creeping disease in Germany and Sweden.[1]

Besides the arterial blood, the absence of direct nervous stimuli may induce a weakness of movement and immobility, which, if the paralysis continues for a time, may pass into a loss of motor conducting power. The first element in this consideration is the absence of cerebral excitement. If motor tracts are not opened from the commencement by the mental impulse, immobility results. The most palpable instance is afforded by the external ear. This organ, which is so essential a feature in the expression of animals, remains motionless in man. The muteness accompanying congenital deafness, or deafness that is early acquired, and the dulness and imperfection of speech in idiots, may also be quoted as instances. On the other hand, we see that physiologists of strong mind and great power of will are able to produce action by motor nerves, which other men have no control over. Mascagni, Gerardi, and other eye-witnesses, affirm that Fontana was not only enabled by practice to move the iris and auricular muscles, but that he could at will retard or accelerate the beat of his heart without marked movement of the muscles of respiration. Professor Müller has even acquired the power of rendering the tensor tympani tense at will. Perfection of execution is nothing but the manifestation of extreme development of certain tracts for the stimulus of mental conceptions. If we could secure similar perseverance anæsthesia, results from the absence of the animating influence of the sensual excitement upon the oculomotor; if the amaurotic subject resolves to do it, he is able to direct the eyeball that is rotated outwards, inwards. I have attempted, in the following descriptions of the paralyses, to draw attention to the arrest of reflex movements, and to form a group of spinal paralyses originating in this manner, and constituting paralysis of the reflex system.

---

[1] See—Hecker; Geschichte der neueren Heilkunde, 1839, pp. 287—349; and Tiedemann, von der Verengung und Schliessung der Pulsadern in Krankheiten, 1843, p. 273.

Among the symptoms of paralysis, those manifested in the muscular and contractile tissue generally are most marked. The loss of all tension in contractile fibres is most conspicuous in the paralysis of the facial nerves; in one case, I found that all the furrows of the affected half of the face and forehead had disappeared within ten minutes after the malady had supervened. The skin becomes flabby and faded, the cheek is pendulous, and when an attempt is made to blow, is distended more easily than the healthy cheek. In an unmarried female, who was paraplegic, I found that the abdominal parietes hung down like an empty bag. There is another symptom of muscular paralysis, which we should meet with more frequently, if we did not neglect to examine the naked body, and which I have seen in several instances; I allude to the oscillation of the muscular fasciculi, similar to the play of the voluntary muscles in animals whose spinal cord has been destroyed. Not less characteristic than the arrest of movement in the paralysed muscle is the contraction of its antagonist, or of the symmetrical muscle of the healthy side; paralysis of the facial muscle, of the muscular nerves of the eye, of the nerves of the respiratory muscles of the trunk, and of the nerves of the extremities, afford sufficient examples of this. Distortions and disfigurements result, which often at first sight indicate the seat of the paralysis, and offer a point of physiological interest, by giving a proof that even in a state of repose, a constant current of the motor power passes from the central apparatus to the muscles by nervous conduction, and that the symmetrical balance must be looked upon as one of those adaptations by which the manifestation of those otherwise visible and sensible movements is prevented. We not unfrequently meet with contractions in the paralysed muscles, whether of a permanent or temporary character. The latter is the manifestation of a persistent irritation of the nerve tissue in the peripheral or central tract, and pro tanto a diagnostic sign of an inflammatory process, softening or carcinoma; whereas, in mere pressure by means of tumours, or in rupture of the fibres, *e. g.* in cerebral hæmorrhage, the paralysed muscles are free from contraction. We find convulsive agitation of the paralysed muscles occur less frequently than evanescent contractions. The permanent contraction with stiffness of the joints and predominance of the flexors must be looked upon as a residue of the paralysis. In such cases I have seen the heel sometimes touch the nates, and the fingers so firmly closed, that fossæ form for the reception of the tips of the fingers, and that violent attempts at opening them fail. The affection is analogous to the shortening of the muscle which remains as a residue of the spasmodic process, and depends upon abnormal conditions not only of the muscular tissue, but also of the ligaments and bones.

The implication of the sensory function in paralysis is manifested in various ways. 1. Conscious sensation is either extinct, it continues, or is exalted. When cutaneous and muscular sensation continues, the patient has a sense of numbness, or oppression, as if a weight were attached to him, or as if the paralysed limb no longer belonged to him; this impression shows itself even in the dreams and deliria of persons lately paralysed; they dream and talk incoherently of human beings, animals, or inanimate objects, lying upon their paralysed side, which they try to remove, or to throw out of bed. When the disease is more advanced, this is not the case. Diminution and loss of the peculiar muscular sense, the perception of repose and action, is most marked in tabes dorsalis, in which affection sight is called in aid to eke out the defective power of grasping. Anæsthesia not unfrequently accompanies the paralysis of the organic muscles in the organs invested with mucous membranes; there is no sense of the want of micturition in paralysis ischuria, nor of the accumulation of mucus in the bronchi when the vagus is paralysed. We must, however, distinguish between anæsthesia and the absence of perception of cutaneous sensation, as it occurs in cerebral paralysis, accompanying sopor and unconsciousness. An abnormal exaltation of sensibility and painful anæsthesia, like the evanescent contraction of the muscles, indicate a state of irritation of the nerves in their peripheral distribution, or more frequently in their central origin. 2. Unconscious sensibility, or centripetal conduction, is often maintained when conscious sensation is interrupted, unless the affection reside in the peripheral nerves; it is manifested by reflex movements in the paralysed members, as we have already shown. They may also be set in motion by motor irradiation, long after they have ceased to obey the cerebral impulse. These sympathetic movements are especially manifested in respiratory acts; thus the arm of an hemiplegic subject often moves, when he yawns it is lifted up, and retains the raised position until the yawn is over, and then falls down like a dead weight. Bell and Marshall Hall were the first to give instances of this, and I have myself observed several. In epileptic seizures, the paralysed limbs are not spared, and even during mental emotions they occasionally move. No great agitation is required to produce this effect; the case of facial paralysis, given at vol. I, p. 202, shows that the mere sense of the ludicrous may produce this result.

At times, the changes in nutrition in paralysed limbs are marked. The investigations of Nasse, junior,[1] Günther and Schön,[2] have shown that, if after division of a nerve, union of the cut ends is not effected, coincidently with loss and diminution of the excitability, structural changes also occur in the peripheral portion of the nerve, the contents, as well as the walls of the primitive nerve-fibrils being absorbed. In paralytic affections in man and animals, atrophy of the respective nerves, *e. g.* of the vagus, has been found; we do not, however, as yet possess any accurate microscopic investigations of the nerves in chronic paralyses, *e. g.* in congenital paralysis. Alterations in the muscular tissue occur in paralytic, as in every other species of immobility, and have been recently described by Skey,[3] Valentin,[4] and Reid.[5] The last-mentioned author found that seven weeks after dividing the sciatic nerve in a rabbit, the muscles of the paralysed side were much paler, thinner, and softer than in the healthy extremity; the weight of the former was 170 grains, of the latter 327 grains. Valentin states, that when examined by the microscope, the pale greyish white fibre shows the transverse striæ less distinctly, or that they are altogether absent in parts. Nor are they rendered more distinct by the influence of cold water, spirits of wine, or other external influences, which generally bring them out more visibly. The longitudinal fibrils become the more distinct, but even they do not possess the sharp outline, and the firmness of healthy muscular fibre; the fibre appears grey and soft, and resembles healthy muscular tissue, which has been macerated for a considerable time. Subsequently, the fibres that have become thus degenerated disappear in part, so that the muscle diminishes in size. The reduction of volume, which would ensue from this process, may, however, be occasionally balanced by the deposit of a larger amount of fat between the fasciculi that remain. Of all paralyses, those induced by lead poisoning most rapidly induced atrophy of the muscles. It is manifested in an eminent degree in peripheral paralysis of the tongue, and as shown in comparative pathology, in the laryngeal muscles of horses, which are frequently affected with paralysis of the vagus. The atrophy is not, however, confined to the muscle, but also extends to the osseous tissue; in the above-mentioned experiment of Dr. Reid, the tibia and fibula of the healthy joint proved to be 89 grains, while those of the paralysed extremity, were only 81 grains. In congenital hemiplegia and paralysis, or that form which is acquired during the first years of life, the growth of the bones is much retarded, both in the lateral and longitudinal dimensions. Here, as in all cases in which the degree and duration of the muscular activity are considerable, the nutritive derangement is most marked; the emaciation is so great, that the epiphyses of the bones project prominently, the tendons and ligaments relax, and the skin becomes flaccid and dry, even when there is perspiration at other parts of the body. The capillary circulation is indolent, the hue of the surface is therefore bluish red, or very pale, and the temperature below par. Dr. G. von Breuning[1] has noticed that the nails of the paralysed extremity grow very slowly. Where there is also cutaneous anæsthesia, the power of resisting external influences ceases, and decubitus often supervenes, as we see more especially in spinal paralysis.

---

[1] Müller's Archiv, &c., 1839, p. 413.

[2] Ibid., 1840, p, 276.

[3] Philosophical Transactions, 1837, p. 375.

[4] Lehrbuch der Physiologie des Menschen, vol. ii, p. 62.

[5] On the relation between muscular contractility and the Nervous System; Edinb. 1841.

---

[1] Wiederbelebung erlähmter Gliedmassen durch den Sehnenschnitt, pp. 33 and 41.

The paralysis varies in degree; it is incomplete (paresis) or complete. In the former case, conduction is not entirely abolished, but it is indolent and tardy. We do not possess, nor shall we ever have a standard to measure the velocity of conduction in health, except the contraction of the muscle for the motor, and the perception of consciousness for the sensitive nerve; still, in partial paralysis, the comparison with the corresponding healthy parts may afford some clue. We do not as yet possess any observations on this subject, excepting perhaps, those given in the chapter on paralysis of the tongue, the accuracy of which, does not, however, seem to deserve much reliance. In medical questions, unfortunately, vague statements have been too often admitted as facts. The frequent assumption of partial paralysis, is itself subject to fallacy, as in such cases the determination of the individual groups of muscles is neglected, and the derangement caused by the motility of one, and the immobility of another set, is looked upon as paresis of the entire limb. There is also another point which is not without importance in estimating the measure of paralysis in the upper and lower extremities. In man the legs support the entire trunk, and at once distinctly indicate a diminution of motor power, whilst the pendent arms, which have nothing to carry, exhibit no weakness. In the same manner, therefore, as we institute experiments on the motility of the lower extremities, while the trunk is leaning or recumbent, we ought to test the upper extremities, by holding and swinging heavy articles, or by making the individual walk on all fours; in the latter experiment, we should make allowance for the unusual position.

I have adopted the same division for the discussion of paralysis, as I have for spasms; viz.:

First Order.—Paralyses dependent upon a Loss of the Conducting Power of the Motor Nerves as Conductors.

1. Affections of the cerebro-spinal tracts; the periphera

paralyses follow the rule of isolated and centrifugal conduction on the side of the affection.

2. Affections of the distributions of the sympathetic. Recent investigations have shown the independence of the sympathetic, and have confirmed the doctrine of the ganglia being central organs, from which direct and reflected stimulation of the motor nerves may result (vide infra), but our knowledge of the pathology of these ganglia is too little advanced to separate them from the peripheral tracts of the sympathetic.

Second Order.—Paralyses dependent upon the Loss of Stimulus of the Central Organs.

1. Affections of the spinal cord.
2. Affections of the brain; in both there is a power of communicating the conditions, and in the cerebral paralysis the conduction takes place in a crucial direction.

The causes of paralyses are only partially known; every period of life is liable to them, from the fœtus to the last stage of existence; there is a congenital and a connate form of paralysis; of the latter we have an instance in the histrionic paralysis caused by pressure of the forceps. During the period of dentition paralysis occurs frequently, both in the lower extremities or in individual limbs, whether convulsions have preceded or not, and they may persist during the whole term of life. Infancy and advanced age are more subject to cerebral, the middle period to spinal palsies. To the latter, especially in the shape of tabes dorsalis, the male sex are much more obnoxious than the female. An hereditary tendency is observed less frequently in paralysis than in other nervous diseases. Paralyses differ from convulsions in their etiological relations by being less frequently based upon anæmia, whilst the continuance of a stronger current to the central organs affords an etiological moment of consequence. It is thus that hypertrophy of the left ventricle favours the origin of cerebral paralysis in itself, and not only by the cerebral hæmorrhage it may induce. A change in the constitution of the blood is more rarely followed by paralysis than by spasms. Lead, arsenic, woorara and tobacco, are substances endued with a specific paralysing power. Among the pathological processes the rheumatic is the most productive of paralytic affections, and in frequency occupies the first position, both in regard to its immediate and its consecutive effects. The interruption and suppression of the cutaneous secretion, by a draught or from getting wet, either paralyse instantaneously or gradually. Instances of the former mode of action are presented to us in facial paralysis, ptosis, or paralytic aphonia; suppression of the copious and peculiar perspiration of the feet, less frequently of the palms of the hands, to which many individuals are liable, affords examples of the latter. In the latter cases there is not so much a metastatic process as the older school assumed, as a coincident affection of the motor and sensitive nerves, a change in their condition of excitement, which gradually reacts upon the central organ. Rheumatism is also of importance in connection with paralytic affections, by the secondary alterations produced in the fibrous tissues, along and through which motor nerves take their course. The internal periosteum of the cranium, the dura mater, plays an important part in this way, it being either primarily affected, or secondarily to a similar malady of the pericranium; it acquires a still further importance by accompanying the cranial nerves. Rheumatic exudation within the sheaths of the nerves, though often spoken of, has not hitherto been met with in the dead subject.[1] The exudation in the cellular tissue of the skin, which Froriep terms a rheumatic node, and which he states to be accurately limited to the distribution of a nervous branch or an entire nervous trunk, has not been confirmed by cadaveric investigation, nor have I met with it during life, although numerous cases of facial paralysis from rheumatism have come to my notice. Syphilitic and scrofulous processes induce paralysis by their influence upon the osseous and membranous envelopes, by producing morbid growths, and by causing tumefaction of the glands lying in the vicinity of nerves. The other pathological processes, inflammation, softening, and hæmorrhage, which are prone to select the central organs for their seat, give rise to paralysis by rupture or by compression of the motor fibres, and not unfrequently mix up symptoms of irritation with those of paralysis. The kidneys, the intestines, and the uterine organs, are the most fertile source of immobility and paralysis; the uterus also acts by the induction of hysterical paralysis. No other class of nervous diseases is so liable to be produced by external injuries as the one under consideration. They operate either indirectly by the induction of other morbid processes, or directly by concussion, compression, or rupture. Concussion by a blow or fall, affects the peripheral or central parts of the nervous system, and even in the first case is rarely confined to narrow limits, but extends through the entire system. Division of a motor nerve, as in cut wounds or surgical operations, and compression, best illustrate the law of isolated conduction; when persons who have suffered amputation of a leg, or cripples, first employ crutches, they experience numbness and a loss of motility in the arms from pressure upon the armpit. If the head is allowed to lie upon the arm during sleep, the fingers are often found numbed in waking.[1] Graves[2] relates the case of a robust man who being much fatigued went to sleep immediately after dinner, his head resting upon his arms, which were crossed on the table. When he woke up one forearm and hand were found to be deprived of movement, and in spite of all the remedies employed, they continued paralysed up to the period of his death, which ensued a few years later. Glandular swellings, morbid growths, aneurisms, dragging cicatrices, give rise to compression. Among the atmospheric influences severe cold may be mentioned as favouring peripheral paralysis, and a sudden fall of the barometer encourages cerebral paralysis. Exhaustion by spermatorrhœa has hitherto been set down as a specific cause of spinal paralysis, and especially of tabes dorsalis, though without sufficient grounds. An important influence is exerted by the continuous use and excessive consumption of motor power, by long continued and fatiguing positions and movements, by epileptic and hysterical convulsions. Mental impressions, especially fright and vexation, bear a close relation to cerebral paralysis.

---

[1] Froriep; Beobachtungen über die Heilwirkung der Electricität bei Anwendung des Magneto-electrischen Apparats, 1843, p. 19.

[An English translation of this essay has recently appeared under the title—On the Therapeutical Application of Electro-magnetism in the Treatment of Rheumatic and Paralytic Affections, by Richard Moore Lawrence, M.D., &c.; London, 1850, 8vo, pp. 205.]—Ed.

---

[1] See—Robert Henley's Communication, in Guy's Hospital Reports, 1822, vol. iii, p. 253.

[2] A System of Clinical Medicine, p. 410.

A combination of several of these causes is most productive of the malady; it is not to be wondered at, therefore, that after campaigns and great events, like the war of liberation at the beginning of the century, the number of paralytic cases increased materially.

Paralysis runs a more uniform course than other nervous diseases; their general type is one of persistence. They rarely present a periodic character (see the chapter on paralysis of the respiratory muscles of the trunk), with which the occasional increase or manifestation of the paralytic symptoms must not be confounded; thus the paralysis of the nerves of the face is often confined to a few fibres, or it exists only in so trifling a degree, that it is imperceptible while the features are at rest, and only shows itself during their play in respiratory movements. Paralysis of the recurrent nerve of one side, often leaves the ordinary movements of respiration undisturbed; but is at once manifested if violent respiratory efforts are made. When the cause of the paralysis is subject to variations, some variation occurs in the course of the disease; as, for instance, in inflammation or softening of the brain, where improvement, arrest, or exacerbation of the symptoms often alternate with one another.

Paralysis is more frequently chronic than acute; it lasts the shortest time in affections of the sympathetic, longest in spinal and peripheral disease. Those proceeding from the brain vary most, from a few hours, as in hæmorrhage within the brain, to an entire existence, as in congenital paralysis.

The *prognosis* of paralysis is unfavorable; for even if recovery takes place, it is rarely complete; some trace is sure to remain. The amount of danger must depend upon the locality and cause of the affection. If the disease is seated in a central organ, the danger is greater than if it occupies a peripheral tract. Paralysis in the range of the sympathetic is of the most dangerous kind. Disorganising processes and morbid growths belong to the most serious causes. The etiological relations also modify the prognosis which we should form from the localisation of the complaint; thus, facial paralysis, induced by necrosis of the petrous portion of the temporal bone, offers less prospect for recovery than if it is induced by exudation at the base of the brain, or by an hæmorrhagic clot, which is capable of being absorbed. We have next to take into consideration the effects of the paralytic affections; in paralysis of the vagus, the access of the air is impeded, and there are changes in the aeration of the blood; the urine is retained in paralysis of the vesical nerves; hollow muscular organs, such as the pharynx, the stomach, the intestines, become distended, if their nerves are paralysed, and the contents which they ought to discharge are retained (Ileus). The danger is increased by complication, especially with anæsthesia, which ushers in destructive processes, such as decubitus, &c.

The *cadaveric results* of paralysis are as manifold as the diseases which arrest the conduction and excitability of the motor nerves. We have already spoken of the consecutive atrophy of the latter. Much remains to be done by future inquirers; many things will always remain a mystery to us.

The *spontaneous cure* of paralysis is effected less frequently by removing the impediments to conduction in the peripheral tracts, than by restoring the excitability from the central organs. A communication of the complaint occasionally takes place, in consequence of impetiginous affections, and a succession of suppressed or active processes, such as the arthritic or trichomatous.

In our *treatment*, we rarely obtain our end by directing our attention solely to the cause, even if we are in every way able to attack it. We are, it is true, by this means, able to remove obstacles to conduction, such as glands and other tumours, or diseased bone; but after the paralysis has lasted any length of time, these measures will not suffice to restore the dried up fountain of cerebral stimulation, nor to remove the alterations that have been effected in the contractile tissues. Both indications are of great importance; the latter the more so, because, as we have already mentioned, the muscular affection may remain as a residue of the paralysis, and because Reid's[1] instructive experiments have demonstrated that galvanic irritation of the paralysed muscles maintains their irritability and integrity. The nerves of the lower extremities were divided in several frogs, within the spinal column, and galvanism from a weak battery applied every day to one paralysed limb, whilst the muscles of the opposite side were left to themselves. After the lapse of two months, the former showed the normal extent and firmness, and contracted well, while the latter had lost half their volume, and contrasted strongly with their fellows; they yet possessed some contractility, but there is no doubt that had the experiment been prolonged, it would, owing to absence of nutrition, and to change in the muscular tissue, have entirely disappeared. All remedies which have for their object the restoration and maintenance of the integrity of the muscles, are therefore indicated in the treatment of paralysis; they are friction, champooing, and particularly electricity, the currents of which, obtained by induction with the electro-magnetic apparatus, are to be preferred to the electricity produced by friction and contact.[2] The antiparalytic effect of electricity seems to me to rest rather upon the vivifying influence it exerts upon the change of matter that occurs in the muscular tissue, than upon its effect upon the nerves, which only enter into consideration as an agent of conduction; as even when the nerve is destroyed, as Reid's experiments demonstrate, the effect does not fail. For this reason, it is most efficacious in metallic paralysis, in which the nutritive derangements of the muscles attain a high degree, and in those conditions in which the muscular affection continues as a residue of the former paralysis; whereas it never can avail anything, while the excitability of the central organs is in abeyance. These circumstances account for the frequent cessation and reintroduction of its use. In modern times, the progress of orthopedia, gymnastics, and tenotomy, have increased the means at our command, by which we are enabled to promote the nutrition of the muscles and the restoration of their power.

We are less able to fulfil the other indication, of restoring

---

[1] Loc. cit., pp. 9—11.

[2] See Froriep's book, as above quoted.

the excitability of the central organs; the attempts we
with this view are very often futile. Our ignorance, a
incurability of the conditions which are the source
interrupted excitability, are partly at fault, partly the al
of any remedies by which we are able to act directly
these organs. We are only acquainted with two influen
which we can do it, viz., mental and reflex stimuli.
former are obtained by the agency of the will and the
tions, and not only by sudden and violent affections, a
fear, despair, but also by an enduring psychical tension, a
be induced by an enthusiastic reliance upon divine and h
aid; the hopes formed are, however, frequently wrecke
the indolence or inconsistency of the patient. The refle
tation is brought into play by the stimulation of centr
sensory nerves; and in availing ourselves of this method
by no means unimportant where and how the stimul
applied. It is in reflex paralysis that the correct choice
mines the success of the treatment; drastic purges are
for the paralysis depending upon the intestinal canal; diu
for the paralysis originating in the urinary organs. We
advert to these points more fully in the descriptions of
diseases. But also in reference to other forms of paralysi
locality and the character of the reflex irritation are not
portant. Certain parts of the surface, as, for instance
soles of the feet, are endowed with a greater capabilit
reflex action than others. Irritant footbaths, containing
muriatic acid or liquor potassæ, are found to be effectual,
the perspiration of the feet has been suppressed, thoug
perspiration is not restored by the remedy.[1] The in
surface of the bladder, on account of its powerful reflex a
deserves more consideration than it has hitherto met
and we should essay the use of injections with cold wa
paraplegia, accompanied by paralysis of the sphincters.
may also avail ourselves of our knowledge of the definite
tions existing between individual centripetal and motor
for the same purpose; thus the fifth pair may be made
upon the facial or oculo-motor; the vagus upon the
nerves, which control the respiratory movements. C
various kinds of reflex stimuli, the most powerful are

---

[1] See Romberg's Klinische Ergebnisse, 1846, p. 69.

applications of heat and cold; moxæ that burn off quickly; the approximation of hot vapours or hot metallic plates; sprinkling or affusion with cold water; frictions in a centripetal direction; electro-puncture, urtication, are also to be recommended, but we must carefully avoid prolonging the experiments until the reflex irritation is exhausted; they should always be repeated frequently at suitable intervals.

We possess two remedies which resemble the reflex stimuli in their mode of action, but in the manner in which we employ them, only act indirectly through the blood; they are the vegetal alkaloids, strychnine and brucine. They have both, but especially the former, been lauded and rejected in turns, which must be attributed to a want of discrimination of the paralytic affection, as well as to the haste and incompleteness of the observation. The following classification of the varieties of paralytic affections may be used as an indication and an encouragement for the employment of the remedy. It may be exhibited, 1, when the inexcitability of the motor nerves continues after the causes have been removed which have arrested the faculty of conduction; 2, in reflex paralysis; 3, in paralysis from commotion, whether of peripheral tracts or of central organs, and especially of the spinal cord. Strychnine is contraindicated when we find disorganisation coexisting with irritation, and in tabes dorsalis, in which case the progress of the disease is accelerated by its use. As regards the technical administration of the remedy, it is important, as in the use of many other drugs, not to exceed the point of saturation, while, on the other hand, its action on the system should be kept up for a considerable time. The paralysed parts are themselves the most sensitive re-agents, and are first and foremost attacked by more or less evanescent contractions and lancinating pains. The employment of strychnine ought not for this reason to be at once abandoned, but we should give smaller doses and at longer intervals; it is only when th symptoms attain a tetanic character, when anxiety and prostration supervene, that we should arrest the exhibition of strychnine, and give carbonate of ammonia, acetic ether, and th like. Among the various preparations the spirituous extra of nux vomica,[1] from $\frac{1}{3}$—1—2 grains, is preferable for intern administration, and the sulphate of strychnine for endermic application. According to Dr. Bardsley's accurate observations communicated in his work, 'Hospital Facts and Observations,'[1] the pure alkaloid given in doses of from $\frac{1}{8}$—$\frac{1}{4}$ a grain, two or three times a day, appears to be very efficacious. Brucine is less powerful in its action, and requires to be given in a four or six times larger dose.

---

[1] [This preparation corresponds to the Extr. Nucis Vomicæ of the London Phar

There is another vegetal alkaloid, veratrine, which has recently come into notice, and has hitherto been chiefly applied in neuralgic varieties of nervous affections; its value in paralysis deserves to be more accurately investigated. In a few cases in which I have employed an ointment containing from ten to fifteen grains of the alkaloid to half an ounce of lard, I found the benefit increased in proportion to the amount of pain associated with the diminution or loss of motility. Finally, there are substances which exert a specific stimulus upon individual motor nerves, such as cantharides upon the nerves of the bladder, secale cornutum upon the uterine nerves.

Among the normal vital stimuli which are capable of curing paralysis, warmth is the most powerful. More has been expected of the effect of animal warmth in the shape of animal baths and accubitus,[2] than has been warranted by experiment; telluric warmth, on the other hand, as afforded to us in thermal springs, frequently manifests its remedial power. The waters of Teplitz and Wiesbaden prove most effectual in rheumatic and arthritic paralysis, those of Aix-la-Chapelle and Nenndorf in metallic paralysis, of Ems in the hysterical form, the waters of Gastein and Wildbad in the paralysis induced by fatigue and exhaustion of the motor power, as occurs in precocious senility.[3]

---

[1] London, 1830.

[2] [Animal baths, balnea animalia, are obtained by immersing the affected parts into the reeking bodies of recently-killed animals. Accubitus consists in placing a healthy vigorous individual, puris naturalibus, in bed with a patient; some of the older authors have recommended this procedure in old age, in place of the Medean system of rejuvenescence. No instance of its medicinal employment since the time of Sydenham has come to my knowledge.]—Ed.

[3] [The main constituents of these mineral waters are as follow:—

Teplitz—Carbonate and sulphate of soda, nitrogen, and carbonic acid gas; temperature of the different springs from 79°—121° Fahr.

The rather unscientific assumption of nervous debility in paralysis has caused the introduction of a farrago of tonic and stimulant remedies into the treatment of these diseases, the unsuccessful effect of which is likely at last to cause them to be abandoned. It is only in an anemic constitution, whether of a primary or secondary character, or if connected with a dyscrasia (as the cachetic paralysis of old people), that we can hope for any benefit to be obtained from the restoration of the blood. In such cases the natural chalybeates, as Pyrmont, Spaa, Driburg, are peculiarly appropriate; the testimony of Doctors Marcard, Brandis, and Brück, speaks strongly in favour of this fact.

In addition to this procedure, we have the choice of two means, by which we are able, in obstinate cases, to obtain a change; it is by inducing a reaction, or by translation. The former indication is fulfilled by using cold water in the form of affusion, the douche, the plunge bath, and in recent times by the methodical application of cold moisture; we possess too few well-observed facts as yet to justify any great hopes of the efficacy of the water cure in paralysis. The skin and the intestinal canal are best adapted for translation or counter-irritation. Issues have an ancient reputation, which they deserve most in diseases of the osseous and membranous envelopes, or in impetiginous complications or metastases. Derivation to the gastric tract of the vagus, by means of emetics, counteracts the paralytic affection of its respiratory distribution.

I may be allowed to close these introductory remarks with the caution not to subject paralytic patients suffering from

WIESBADEN—Chloride of sodium, carbonate of iron, and carbonic acid; temperature from 118°—158° Fahr.

AIX-LA-CHAPELLE—Carbonate of soda, chloride of sodium, sulphuretted hydrogen, nitrogen, and carbonic acid gas; temperature from 115°—135° Fahr.

NENNDORF—Sulphate and carbonate of lime, sulphate of soda, and sulphuretted hydrogen; temperature 50°—59° Fahr.

EMS—Carbonated alkalis and earths, carbonic acid gas; temperature, 72°—122° Fahr.

WILDBAD and GASTEIN contain no appreciable amount of mineral constituents; their effects are attributed to their temperature, which is from 80°—110° Fahr.

For full information on the subject, see—Dr Sutro, on the German Mineral Waters, London, 1851; and Dr. Sobernheim, Deutschland's Heilquellen, Berlin, 1836.]—ED.

maladies that we know to be incurable, such as tabes dorsalis or destruction of portions of nerves, to useless and painful attempts at treatment. It is in these cases that the man of science establishes his superiority over that herd of practitioners who now-a-days pounce upon every sick person as their legitimate prey.

FIRST ORDER.

PARALYSES DEPENDENT UPON A LOSS OF CONDUCTING POWER OF THE MOTOR NERVES AS CONDUCTORS.

CHAPTER XXXV.

PARALYSIS OF THE FACIAL NERVE.

HISTRIONIC PARALYSIS.

THE characteristic features of this variety of paralysis, to which an historical interest attaches, as it served to lead Bell to the regeneration of the pathology of the nerves, on which account it still goes by the name of Bell's paralysis in England, is the arrest of the movements of those muscles which are supplied by the facial nerve; it affects a few or all the muscles of one or both sides of the face. The patient is unable to corrugate his forehead, the furrows on which disappear at once with the paralysis, so that the brow of an old man becomes as smooth as that of a child, and no more effectual cosmetic is to be found for elderly ladies. The eyebrow can neither be drawn up nor corrugated, and assumes a lower position; the lids cannot be closed, and are deprived of their blinking movement. The ala nasi is sunk, and is not expanded on deep inspiration, in blowing the nose, nor in smelling. The palsied cheek swells out in speaking and in other expiratory actions. Enunciation, especially of the labials, is impaired; attempts at spitting, blowing, or whistling, fail; the air escapes from the paralysed fissure of the lips, and the saliva and beverages taken leak out. In eating, the food is apt to accumulate between the inner surface of the cheek and the teeth, as the lips and the cheek refuse to assist in mastication.

Not less characteristic than the arrest of movement in the muscles supplied by the facial nerve in unilateral paralysis, is the overbalance acquired by the antagonising and symmetrical muscles of the healthy half of the face. The open state of the eye, in waking and sleeping, depends rather upon the increased activity of the levator palpebræ than upon the paralysis of the orbicularis. The upper eyelid is strongly drawn up, it shows a smaller edge than the healthy eye, which therefore appears larger than its fellow. This would not be the case in mere immobility of the orbicularis, of which we may easily convince ourselves in division of the levator palpebræ, as performed by Professor Dieffenbach, for the removal of the deformity. The contraction of the muscles of the healthy half of the face is chiefly at fault in causing the disfigurement, as it alters the median line, and draws the tip of the nose and mouth on one side. The distortion of the features which may be present in a marked or very trifling degree in unilateral paralysis, becomes more prominent in all histrionic or respiratory movements of the face, in speaking, laughing, crying, sneezing, blowing the nose, yawning, or in violent emotions.

The effect is different when both facial nerves are paralysed. In two cases that have recently come to my notice, the face presented no disfigurement beyond the eyes being distended; in one of the patients, however, a man aged 43, the smoothness of the forehead and the absence of every kind of furrow was remarkable. The absence of expression in speaking was yet more conspicuous in the beautiful countenance of a young lady. One of the patients was very sensitive on this point, and termed it his greatest misfortune that he was forced to be joyful or sad without making any demonstration of his feelings to his fellow creatures. In a girl of 16, in Dupuytren's[1] 'Clinique,' who was affected with bilateral paralysis, there was no distortion, but a pendulousness and entire absence of motion was perceptible in all the features. The eyelids only closed half, the lips stood apart, and played backwards and forwards from the impulse of respiration. The expressive countenance bore a serious character, which contrasted forcibly with the patient's frame of mind. She was heard to laugh aloud, but the laugh appeared to come from behind a mask.

The paralysis of the muscles is accompanied by some other phenomena. On account of the immobility of the lower eyelid the tears cannot be easily conducted to the inner angle of the eye; they accumulate and trickle down the cheeks, in consequence of which the corresponding nostril is dry. Owing to the absence of protection afforded by the movements of blinking and closing the eyelids, the eye is exposed to external influences, and is not unfrequently attacked with conjunctivitis. The respiratory effort is prevented by the immobility of the nares, which is essential to full gratification of the sense of smell; for this reason animals in whom the trunks of the facial nerves have been divided, are no longer able to follow scent or to prick up their ears to listen.

---

[1] Bell; The Nervous System of the Human Body, p. 327, 3d edit.; Edin., 1838.

If the affection be limited to the facial nerve, the sensibility of the face is unimpaired; I have satisfied myself and others of this by an accurate examination of all cases of the kind that have presented themselves to me. When the paralysis has lasted for a considerable period, we find that the skin covering the muscles paralysed, especially of the cheek, becomes relaxed and flaccid. In paralysis of the palpebral twigs there is not unfrequently a procidentia and semi-ectropium of the lower eyelid.

The above description includes the prevailing features of histrionic facial paralysis; they are somewhat modified by the seat of the disease.

I. PARALYSIS OF THE PERIPHERAL PORTION OF THE FACIAL NERVE.—The physiological characteristic is the isolated non-conductibility on the same side as the exciting cause.

The diagnostic signs differ according to the seat in the different portions of the facial, that is whether the affection resides in the superficial branches, in the part passing through the temporal bone, or at the base of the brain.

a. The Paralysis caused by an affection of the superficial distribution of the Facial Nerve.—External injuries and surgical operations occasionally leave a paralysis limited to one or a few branches of the facial nerve. In a young man, in whom a large steatomatous tumour had been removed from the cheek, by which operation the labial and nasal twigs of the facial had been divided, I found the left upper lip, and the left ala nasi, paralysed. Bell,[1] in extirpating a tumour near the ear, divided the branch of the facial nerve which goes to the angle of the mouth; some time after, the patient, who was a coachman, came to Sir Charles to thank him for his cure, but at the same time complained that he was no longer able to whistle to his horses. Pressure of a permanent or temporary kind upon the facial nerve, deprives the facial nerve of its conducting power. Sir Benjamin Brodie[1] has met with a unilateral facial paralysis, resulting from a blow upon the cheek. Pressure of the forceps often induces a connate form of facial paralysis, which was first pointed out by Dr. Osiander,[2] and has been attributed by Dr. Landouzy[3] to compression of the facial nerve. The pressure of the forceps rarely affects the trunk of the nerve itself at its exit from the stylo-mastoid foramen, but as the blades are generally applied in the occipito-mental diameter, so that the posterior edge of the blade presses a few lines anteriorly to the auricula, on a level with the main branches of the facial, the nerves of the eyelids, the ala nasi, and of the lips, are liable to be affected. The paralysis may, however, be more limited if the pressure does not operate uniformly, and only involves a few filaments. Immediately after birth, at the first cry of the infant, the distortion of the features manifests itself, but there is no patency of the eyes. Sucking too is well performed if the nipple is normal.

---

[1] The Nervous System, &c., 3d ed., 1836, p. 56.

Tumours and deep cicatrices give rise to permanent compression; it is generally by tumefied lymphatic glands, in the vicinity of the mastoid process, or at the lower edge of the inferior maxilla, that pressure is exerted upon the facial as it issues from the stylo-mastoid foramen, and paralyses the whole of its facial distributions. Ragged cicatrices of scrofulous ulcers occupying this part operate similarly. Degenerations of the parotid[4] and morbid growths, less frequently induce the affection. The ramifications of the facial are most frequently paralysed by the influence of cold or draughts, though they do not always suffer in their entire extent, but sometimes are only affected in groups, so that according to the law of isolated conduction, only one group of muscles, or an individual muscle, may become paralytic. The nerves of the orbicularis palpebrarum are especially liable to lose their conducting power in this way, and we then have to deal with lagophthalmus paralyticus. In the above-mentioned case I found that, owing to a rheumatic influence, the action of a cold current upon the heated face, first induced paralysis in the right, and two days subsequently, in the left side of the face.

---

[1] Abercrombie; Pathological and Practical Researches, &c., 3d ed., p. 280.

[2] Handbuch der Entbindungskunst; Tübingen, 1825, vol. ii, part 2.

[3] Essai sur l'Hémiplégie faciale chez les Enfans nouveaux-nés; Paris, 1839.

[4] See an accurate observation by Billard, in—Descot's Dissertation sur les Affections locales des Nerfs; Paris, 1825, p. 318.

b. The Paralysis caused by an Affection of the Facial in its passage through the Temporal Bone.—In injuries to the head fissures and fractures may occur in the os petrosum, in which case the histrionic paralysis of the corresponding side affords a diagnostic sign of the seat of the injury. Sir Charles Bell[1] relates a case of this kind, in which a pistol shot through the ear had broken up the petrous bone, and torn the facial nerve; and another in which a man, after a fall upon his head, survived for a week in a state of sopor, the left half of the face being paralysed. A fracture was found to pass transversely through the base of the brain and the left petrous bone, and it had torn the facial end, the point of its entrance into the internal meatus. Tuberculosis and consequent necrosis of the temporal bone, are frequent causes of the affection.[2] My opinion was taken, in 1835, for a girl of two years, in an extreme state of emaciation from tabes mesenterica, and affected with otorrhœa of the left ear. When the abdomen was pressed the girl began to cry, but only the left side of the face showed any play of the features, the right remained motionless. The corrugator supercilii did not move on this side, while the right corresponding muscle contracted the brow. The left eyelids stood open, the eye was turned up, whereas the right closed during crying, and as the mother assured me, when the question was put, during sleep also. The left ala nasi was collapsed, the tip of the nose and the mouth being drawn over to the right side. When in a state of repose there was no distortion of the features beyond a wider distension of the eyelids, causing the right eye to appear larger than the left, and a slight inclination of the tip of the nose to the right side. A few days after, the child died. The cranial cavity was examined by Dr. Henle, the prosector to the university. On the arachnoid of the surface of the two hemispheres of the cerebellum, there was a large number of small granulations consisting of what resembled inspissated pus. In the cortical tissue of that portion of the middle lobe which rests upon the left petrous bone, three deposits of tubercle were found. After removing the dura mater, the pars petrosa appeared of a brownish hue, and looked worm eaten; it was dissected out and carefully examined. It was thoroughly carious. No trace of the malleus was to be found, nor was there a membrana tympani, so that the pus escaped freely through the cavity of the tympanum and the external ear. The facial nerve, at the part termed the genu, was healthy, but within the Fallopian canal a part was disorganised by a softening process. In another case, examined by Froriep, not only the cells of the mastoid process, but even the Fallopian canal itself, were filled with tubercular matter, so that the facial nerve was compressed as far as its point of exit. The os petrosum was necrosed, and the membrane of the tympanum and the ossicula auditus, with the exception of the stapes, were destroyed. Osseous tubercles were also found in the upper and lower extremities.[1] The facial is occasionally affected by a tumour of the dura mater, or the bone itself, at its entrance into the foramen auditorium of the petrous bone, a few instances of which have been communicated by Gregory.[2] In a man, 40 years of age, on the cessation of an otorrhœa from the right ear, which had troubled him from his infancy, deafness and paralysis of the muscles supplied by the right facial nerve, ensued. Death resulted from a disease of the pancreas; a tumour of the size of a walnut was then found imbedded in the pars petrosa of the right temporal bone, of cartilaginous hardness and pearly lustre, projecting above the foramen auditorium, and firmly compressing the facial and auditory nerve.

---

[1] Loc. cit., pp. 253 and 282.

[2] See—Romberg; über Lähmung des Antlitznerven durch Krankheit des Felsenbeins, in Casper's Wochenschrift für die gesammte Heilkunde. 1835, p. 601.

The second case, which is particularly interesting, as the tumour protruded from the cranial cavity, occurred in a female of 35, who was affected with paralysis of the right side of the face, and deafness of the corresponding ear. For a time there had been a discharge from this ear, during which the deafness was diminished; at the same time she complained of cephalalgia of the right side, and frequent painful vomiting. A deep-seated tumour of a considerable size was discovered between the right angle of the jaw and the mastoid process. The external and internal administration of iodine reduced the tumour, but the movements of the features continued impaired. Half a year later she was admitted into the hospital; at this time the symptoms were violent headache, tinnitus aurium, intolerance of light, contraction of the pupils, strabismus, and vomiting. The tumour was enlarged, the paralysis and deafness unaltered, articulation was indistinct. Erysipelas extended from the head, upon which a blister had been applied, over a large portion of the body. The patient died of great exhaustion and emaciation, without any preceding sopor or convulsions. The external, firm, scirrhous mass formed a portion of a broad, irregular tumour, or rather a chain of tumours which were closely attached to one another; they had produced absorption of the cuneiform process, and of the right condyle of the occipital bone, as well as necrosis of a large part of the right temporal bone, into which a portion of the tumour was deeply and firmly imbedded. The tumour occupied a considerable space in the fossa cerebelli, so that the right hemisphere of the cerebellum, the pons Varolii and the medulla oblongata were compressed and pushed over to the left side. Both restiform processes appeared flattened; the right facial and acoustic nerves were softened and compressed by a portion of the tumour, above which the fibres of the glosso-pharyngeus and hypoglossus were spread out; the abducens was also compressed. A small firm tumour of the size of an olive, with a portion of the larger mass, to which it was loosely attached, had penetrated deeply into the substance of the right hemisphere of the cerebellum.

---

[1] See Massalien; Dissert. Inaugur. de Nervo faciali; Berolin. 1836.

[2] Edinburgh Medical and Surgical Journal, 1834, vol. xlii, p. 272.

The diagnosis of the disease affecting the facial in its passage through the bone, depends upon—1, the phenomena which are induced by the morbid process in the bone; otorrhœa, with rejection of necrosed portions of bone, of the ossicula auditus, &c.; 2, upon the implication of the auditory nerve, when the cause resides at the point where the facial enters into the petrous bone, in which case deafness commonly accompanies the paralysis; 3, upon peculiarities in the paralytic phenomena. On account of all the primary fasciculi of the facial being involved in the trunk, not only the branches distributed to the face are deprived of their conducting power, but also some nerves about whose physiological distinction we are yet in the dark. They are the chorda tympani and the nervus petrosus superior. Arnold[1] was the first to demonstrate that a twig of the chorda tympani was a motor root of the ganglion sub-maxillare sive linguale, and has since[2] drawn attention to the influence exerted upon the expulsion of the saliva from the ductus Whartonianus in a case of paralysis of the facial, in which the discharge of the saliva was diminished on the affected side. In my patient whose case has been related above, the paralysis of both facial nerves resulted from an external injury to the head; the temporal bones had suffered especially, by being compressed between two beams, as proved both by deafness supervening with the paralysis, which afterwards disappeared, and by hæmorrhage from the ears. There was a very unpleasant sense of dryness in the cavity of the mouth, which the patient sought to remove by frequent rinsing and gargling. The lower surface of the tongue and the cavity of the lower jaw was drier than usual.

The facial nerve also supplies the salivary duct;[3] but when the disease resides in the facial ramifications, it is difficult to determine whether a similar arrest takes place in the evacuant movements of the ductus Stenonianus, as the duct of the submaxillary gland continues to act. The patients suffering under this malady that I have attended, and even the female labouring under paralysis of both halves of the face, did not complain of dryness in the corresponding part of the oral cavity. There is another phenomenon frequently observed in paralysis of the facial nerve within its osseous canal, which we must consider at this place; it is the alteration and diminution of taste on the corresponding side of the tongue, without any implication of the sensibility or motility of the tongue. Professor Roux was himself affected with facial paralysis, and perceived a metallic taste in the right half of the tongue as a precursor of and an accompanying symptom of the paralysis.[1] Montault[2] quotes a few more instances. Recently Dr. Bernard[3] has again directed attention to the subject, and has also examined the subject anatomically and physiologically. In one case paralysis of the left half of the face was associated with deafness, and an injury to the temporal bone had preceded for several years. Sensibility had been maintained entire, even in the tongue, which was perfectly moveable in every direction. At the anterior portion of the left half of the tongue the sense of taste, especially for some things, was diminished; powdered citric acid was tasted much slower and weaker at this part than on the right side. The author considers the chorda tympani to be a motor nerve distributed to the mucous membrane of the tongue, for the purpose of causing the erection of the nervous papillæ, and rendering them more susceptible of sapid articles, a view that is not likely to meet with many supporters. The phenomenon itself requires further confirmation.[4] Bidder[5] was the first to offer a physiological explanation of the functions of the nervus petrosus superficialis major; he considers it as a motor nerve passing from the facial to the sphenopalatine ganglion, destined to move the velum palati. The unilateral paralysis of the velum palati seems to depend upon the loss of conducting power in these nerve fibres, which gives the uvula a slanting direction, causing its point to be directed to the paralysed side; it resumes its normal position after a cure has been affected. In four patients affected with palsy of the facial I have noticed the hemiplegic condition of the velum palati. One was an otherwise healthy man, 38 years of age, who having caught cold in washing his neck and face, was seized with paralysis of the left facial in its entire extent. At the same time he complained of a dull pain

---

[1] Der Kopftheil des Vegetativen Nervensystems beim Menschen; Heidelberg, 1831, p. 119.

[2] Untersuchungen im Gebiete der Anatomie und Physiologie, 1 Bändchen; Zurich, 1838, p. 210.

[3] Longet; Anatomie et Physiologie du Système Nerveux; Paris, 1842, vol. ii, p. [illegible]

---

[1] Descot; Dissertation sur les Affections locales des Nerfs; Paris, 1825, p. 331.

[2] Dissertation sur l'Hémiplégie Faciale; Paris, 1831, p. 15.

[3] Recherches Anatomiques et Physiologiques, &c.—in Journal de l'Anatomie et de la Pathologie du Système Nerveux; Paris, 1843, vol. i, p. 408.

[4] In an article by Mr. Wilde, of Dublin, on the Cause and Treatment of Otorrhœa, I find it remarked, that the application of lunar caustic to the membrana tympani, is often tasted. A young lady in whom small excrescences grew through the perforated tympanum, related that she distinctly felt the effect of the caustic running down the margin of the tongue, but never reaching the tip. (From the Journal für Kinderkrankheiten von Behrend und Hildebrand, vol. iii, p. 193.)

Neurologische Beobachtungen, 1836, p. 40.

When the disease resides in the superficial distribution of the facial nerve, the velum is not affected, a fact of which I have convinced myself by repeated observation. We do not know what influence is exerted by paralysis of the stapedius muscle, which is supplied by a twig of the facial nerve.

c. *The paralysing agent is seated at the cerebral origin of the facial nerve.* Exudation and tumours in the vicinity of the pons Varolii are the common cause of this affection; the tumour occasionally proceeds from the dura mater;[1] the histrionic paralysis affecting the entire range of the facial is in these cases accompanied by a successive implication of the adjoining nerves, the acoustic, the abducens, the trigeminus (deafness, strabismus introrsum, anæsthesia,) depending upon the extension of the tumóur. We have already given an instance at page 272, and we shall have occasion to mention another as we proceed.

2. PARALYSIS OF THE CENTRAL TRACT OF THE FACIAL.

The physiological characteristic of the affection is, that the conduction takes place in a crucial direction; the diagnostic sign is, that other sensory and motor nerves of the face and trunk participate in the loss of the power of conduction. A peculiar feature in the centric paralysis of the facial nerve in disorganisation of the brain is, that with few exceptions the entire distribution is not affected, but those fibres only are implicated which supply the muscles of the alæ nasi and the upper lip, and are the agents of the respiratory functions of the facial, which for this reason was termed by Bell the facial nerve of respiration. (Compare the post-mortem examination of Dupuytren's brain, as given in the chapter on cerebral paralysis.) The snuffling respiration and the blowing-up of the lip in the breathing of apoplectic subjects, is due to this cause. In the description of the death-struggle given in the prognostics of Hippocrates, the *ρῖς ὀξεῖα*, the pointed, sunken nose, forms a main feature.

In addition to the seat of the disease, the relation of the facial nerve, as one of motion, to reflex and cerebral stimulation, deserves our consideration on account of the modifications of the phenomena it gives rise to. Bell,[2] whose work is no less rich in promising germs than in mature fruit, observes : you find the portio dura in possession of distinct propertie of them related to respiration, breathing, speech, and expres you will not be surprised that these functions should occa ally be differently affected ; as, for example, a man will cont to possess the power over the nerve, as the nerve of speech, yet he will be incapable of expressing the usual signs in laug or in crying. In short you find that your patient someti exhibits paralysis of the side of the face only when he s or laughs, at other times it is not observable. We really no reason to conclude that the one property of a nerve requ a finer organisation than another. I should rather sup that this power of expression is constituted with a finer rela to the condition of the mind and of the body; and there we may suppose is more easily affected by slighter rangements."

---

[1] Abercrombie; loc. cit., p. 422.

[2] The Nervous System, &c., p. 256.

One of the most instructive cases by which the differen the stimulus of the will from the reflex impulse or the influ of emotion, is exhibited, has been observed by my friend Magnus, and has been elegantly described by him in Müll Archiv.[1] I have myself often examined the patient, finally she became a patient of mine in the cholera hosp where she died. The following are the main points of case :—The subject was a widow, aged 50, who had alre passed through two apoplectic attacks, causing the loss speech and paralysis of the left side ; the first had superve during a confinement after violent vexation and the cessat of the lochia, the second in consequence of her menses be suppressed by a cold. After the latter the paralysis of extremities was removed, but speech was not restored, as been the case after the first seizure. The face of the pati was perfectly smooth, without either a furrow or an expressi All the muscles of the face were deprived of voluntary mo ment. She was neither able to contract her forehead nor eyebrows, to raise the nostrils nor to move her cheek and ch She was incapable of closing the eyelids voluntarily. Wh required to do it she used her finger, or looked on the grou by which the eyeball was directed downwards, the levator t relaxed in its contraction, and the upper eyelid also mo downwards. On the other hand, the eyelids closed perfectly as soon as a sudden movement was made towards the eye of the patient, if she was directed to look suddenly into a bright light, or when she sneezed. During sleep the eyes were also perfectly closed. The patient was neither able to raise nor close her lips, so that the mouth was constantly opened slightly and the saliva ran out, rendering it necessary for the patient to be constantly wiping her lips. The lower jaw was moveable, the patient was able to open her mouth and chew; but even these movements were not quite of a healthy character, for she was unable to open the mouth wide, and she was equally incapable of performing rapid movements of the lower jaw upon the upper jaw, so as to strike the two rows of teeth against one another with sufficient force. The tongue did not in the least obey the will; the patient was neither able to protrude it between the teeth, nor to move it backwards or to the sides; it lay in the mouth like a wedge, and rendered voluntary deglutition and mastication almost impossible; for when the patient had introduced food between the teeth, she was obliged, as the tongue was immoveable, to push it from side to side with the finger, and also when she chewed to push the morsel over the tongue into the pharynx; as soon as this was done, all the movements of deglutition ensued, with all those movements of the tongue which are generally under the control of the will in health. The same took place in drinking; if deglutition was to be obtained, the head required to be bent backwards, and the liquid had to be poured down, or to be introduced beyond the velum by means of a spoon, otherwise it was apt to run out of the mouth again. From time to time, even without taking food, the secreted saliva was spontaneously swallowed, as it accumulated to so great an amount as to fill the entire cavity of the mouth, and then, like a chewed morsel, induce deglutition. The sense of taste, as well as the tactile sensation, were unimpaired both in the tongue and throughout the surface of the face. Speech was impeded, but there was not complete aphonia, for the patient was able to utter an inarticulate sound, but it was out of her power to modulate its pitch. The sound was not a distinct vowel, but something like *ang* or *ong*, for even when the mouth was wide open she was unable to say *a* distinctly, much less to articulate any other vowel. There is action in accelerated respiration after running, going up stairs, &c. Nevertheless, the child was as able to controul the muscles on this side as those on the left; she could move the angle of the mouth, dilate her nostrils, wrinkle her forehead, and contract her eyebrows at will. There was no marked change in the sensation of the right side. The movements of mastication were undisturbed at either side. When the child was regarded full in the face, while in a state of repose, the mouth was found to slant, as in the usual instances of sudden peripheral paralysis of the facial nerve; but as soon as the features were altered by emotions or by talking, the unequal action of the two sides of the face became manifest. Besides, when looking straight at the patient, it was easy to see a certain emaciation of the affected side, which was particularly conspicuous at the chin, where the prominence of the quadratus menti was absent on the right, but was well marked on the left side. The child was delicate, and the malady was developed gradually. Besides there was a deviation of the vertebral column between the scapulæ, of about one third of an inch from the straight line to the left, and the right half of the thorax appeared sunk to the same extent. On compressing the epigastric region, it appeared that the right half of the thorax scarcely took any part in the forcible thoracic respiration which was induced by the pushing back of the diaphragm. When this kind of examination was made, the apathy of the one half of the face was particularly manifested at the nares; whilst the right one remained immoveable, the left one expanded fully at every act of inspiration.

---

[1] Jahrgang, 1837, p. 258.

We have lastly to allude to the immobility of the muscles supplied by the facial in anæsthesia of the fifth pair. We have already mentioned, that division of the fifth pair in animals gives rise to an arrest in the movements of the face, especially in reflex action. In three cases of anæsthesia of the fifth nerve of the left side, two of which I have myself observed, not only the reflected movements were arrested, but the voluntary ones were much impeded and in part prevented. One of the patients was unable to draw the mouth with sufficient force to the left side, and the other was unable to move the diseased side of the face with the same force and rapidity as the healthy side.

There is no period of life which may not be attacked with histrionic facial paralysis; even the unborn infant, as we have already seen, is liable to the affection; the period of infancy on the whole predisposes more to paralysis from disease of the bones or glands; advanced life, after the fiftieth year, to centric paralysis. Among the dyscrasiæ, scrofula is a more frequent predisposing cause than syphilis and carcinoma; they act by involving the parts adjoining the nerves, the cellular tissue, the membranes and bones. Dr. Landouzy[1] has described a remarkable instance in which carcinoma gave rise to the complaint. The patient, a female, suffered from anæsthesia of the fifth nerve, and paralysis of the facial of the left side; a scirrhous tumour extended in the left half of the face from the upper part of the ear to below the angle of the jaw; death ensued from pneumonia. At the post-mortem a scirrhous tumour was found at the base of the brain, pressing upon the ganglion Casseri and the divisions of the fifth nerve; there were also numerous encephaloid growths in the liver and kidneys. One of the most frequent exciting causes is rheumatism, or cold taken while the surface of the face is hot or perspiring. Joseph Frank[2] states, that there were seven among his patients who were suddenly attacked with this paralytic affection on getting up in the morning and putting their head out of window and drawing back because they found it very cold. One of my patients, on waking up during the night from a heavy dream, exposed her face, which was bathed in perspiration, to a current of air, and on the following morning found that her features were distorted. Shaw[3] states that during the prevalence of the cold winds in East India the disease occurs very frequently. Nothing is more likely to produce the affection than a current of air impinging upon the part while the patient is asleep, *e. g.* from sleeping with an open window. It is very common for pain and tumefaction, accompanied by febricitations, to occur in the affected side of the face, after the patient has caught cold; these symptoms disappear after a few days, and the paralysis remains. Among the centric causes, hæmorrhage and softening of the brain are the most common. Violent mental emotions have in some instances preceded the occurrence of the paralysis.[1]

---

[1] Bulletin de la Societé Anatomique, 1839, No. 11.

[2] Prax. Medic. Univer. Præcepta, vol. i, 2d ed.; Lipsiæ, 1841, p. 555.

[3] Medico-Chir. Transactions, vol. xii, part 1, p. 128.

Histrionic paralysis of the face is rarely of brief duration; I have found it shortest in the rheumatic variety; but even in this case, and in favorable circumstances, I have rarely seen it yield in less than six weeks; once I found a cure ensue in eight, another time in fourteen days. Montault[2] quotes a case from Roi, of the disease running a periodic course in a woman, who only presented regular features during the full moon, but while the moon was in the wane, was disfigured by paralysis; but it is too incomplete to bear rigid criticism.

The diagnosis of the peripheral or centric origin of the disease is of extreme importance in reference to prognosis and treatment. It not rarely happens that the practitioner mistakes peripheral paralysis for a centric affection, and at once has recourse to the lancet or leeches, and neither allows himself nor the patient rest till he yields to the innocent and pleasing conviction that he has removed a great peril. By attending carefully to the law of isolated conduction, and to the irradiation belonging to the central apparatus, we shall avoid such errors. On the other hand, we must carefully avoid looking upon the affection when residing in the peripheral distribution of the nerve as always more favorable and less dangerous in a prognostic point of view. When the facial nerve is affected in its passage through the bone, there is not only a prospect of the disease proving incurable, but life itself is often perilled by the brain becoming implicated in the adjoining disorganisation, while the cure of centric paralysis is rendered possible by the apoplectic effusion being reabsorbed.

We possess no trustworthy data, as yet, to prove the spontaneous cure of histrionic paralysis following division and injury of the facial nerve by wounds and operations. Not only is the anatomical evidence wanting, which experiments upon animals have afforded with regard to other nerves of motion and sensation, but the proofs with reference to its physiological functions are also contradictory. Shaw[3] found the motor influence restored in two months in a monkey and a dog in which he divided the facial, while in another dog the paralysis persisted after four months. Magendie[1] found no trace of movement after ten weeks, and is of opinion that in the first case Shaw had not completely divided the nerve. In the instance above related I myself found the nasal and labial twigs paralysed a year and a half after the operation. On the other hand, in a boy of nine years, who had been attacked by murderers, and had received a penetrating stab with a knife in the vicinity of the stylo-mastoid foramen, I found that the paralysis of the labial and nasal branches of the facial disappeared after two months. In other varieties of facial paralysis, especially of rheumatic origin, in which the connection of the nerve with the central organ is maintained, I have seen the motor principle restored without any medical interference. I have convinced myself of this in several patients, who set aside all remedies, and after a quarter or half a year were entirely free of their paralysis. In one of my patients, a boy of eight years, otorrhœa and deafness of the left ear, with paralysis of the left side of the face, supervened upon scarlet fever. The most various remedies proving unavailing, his malady was left to take its own course. The otorrhœa has ceased, the paralysis has almost left him after six months, and only the deafness remains. The facial paralysis of new-born infants, that is caused by pressure of the forceps, gets well spontaneously, sometimes after a few hours or days, and, rarely, after the lapse of months. When recovery ensues it is remarkable that the conducting power is not restored in all branches of the facial at the same time, but returns successively in its different parts; thus the mouth may have resumed its straight position, while the eyelids are yet dilated, or the reverse; this must also be looked upon as a proof of the law of isolated conduction. There is another phenomenon which has not hitherto been attended to, and which is perceptible after the cure of the paralysis. It is that the eye of the paralysed side becomes smaller; I have observed it in several of my patients, and should explain it by the orbicularis overbalancing the levator tarsi which has become relaxed subsequent to its previously increased tension.

---

[1] Joseph Frank, loc. cit., p. 556.

[2] Dissert. sur l'Hémiplégie faciale; Paris, 1831, p. 18.

[3] Loc. cit., p. 139.

The only *prophylactic* measures that we can adopt are those suggested in surgical operations by Dieffenbach, namely, of making the incision along the mesial line of the face and turning back the skin in order to avoid injuring the facial nerve.

---

[1] Journal de Physiol. Experiment., vol. i. p. 121; vol. ii, p. 82.

In selecting our *treatment* we have first to attend to the cause of the complaint. When it is to be referred to rheumatic affection, emetics, the tincture and wine of colchicum, and, above all, blisters are to be recommended, the latter should be applied between the angle of the jaw and the mastoid process, and suppuration be maintained for a considerable time. In plethoric individuals, and if there be pain, especially in the ear, the local abstraction of blood by cupping and leeches to the mastoid process or at the back of the neck is advisable. When glandular swellings or indurations arrest the conducting power of the facial nerve, we must attend to the treatment of any cachectic conditions that may be present, whether of a scrofulous or other character, and we must also employ discutient remedies locally, such as mercurials, iodine ointment, or the combination of both in the shape of the biniodide of mercury. When there is any dyscrasic swelling of the bones, whether hyperostosis or exostosis, there is room for hope, even if the petrous bone or the base of the cranium be the seat of the disease, provided the nerve is not disorganised. Thus in the case cited from Dupuytren, of bilateral facial paralysis, there was a syphilitic predisposition, and the patient was restored by corrosive sublimate, sarsaparilla and blisters. In inveterate cases we must have recourse to the inunction and starvation cure.[1] (Hunger- and Schmier-Cur.) When there is a deposit of tubercular matter in the bones, accompanied by otorrhœa, oleum jecoris, and especially iodide of iron, are to be recommended, as well as the employment of salt baths. We shall have occasion to revert to the subject of central paralysis at another portion of the work.

If after we have exhausted our attempts to remove the cause, the paralysis continues, as is only too often the case, we

---

[1] [For the details of the systematic procedure by inunction and starvation, we must refer to the works of Rust, Velpeau, Cullerier, and others; the principle followed out is the introduction of a maximum of mercury by the skin, and of a minimum of food by the mouth; it is mainly in favour as a remedy for inveterate syphilis, though Velpeau also employs it in peritonitis and phlebitis uterina.]—Ed.

are justified in availing ourselves of those remedies wh
an influence upon the motor power of the nerves.
these we have to enumerate nux vomica; its alkaloids
phate or acetate of strychnine) applied endermically
amount of $\frac{1}{6}$—$\frac{1}{3}$ of a grain twice a day to the raw sur
blister; frictions in a centrifugal direction, by them
combined with volatile substances, such as the balsam
Hoffmanni,[1] unguentum nervinum, spirits of ammon
the cold and warm douche, vapours; moxæ; the
waters of Töplitz and Gastein; galvano-puncture; and
magnetising; the latter I have found effectual in a
fell under my notice, in which the disease had las
years, and the remedy was persevered in for thi
successive weeks.

In paralysis of the face of long standing, and acc
by great distortion of the face, Dieffenbach[2] has a
surgical procedure, which though not likely to be
adopted, has the merit of originality. As in paralyt
the antagonistic muscles of the healthy side of
contract permanently and rigidly at the expense
paralysed muscles; and it was to be expected that
the division of the healthy muscles, which pro
considerable diminution of the contractility, woul
measure, restore the equilibrium. The immediate
the operation was indeed surprising; the patients w
after the division of the levator palpebræ superioris,
the eye; and after the division of the orbicularis or
healthy side, the distortion of the face was relieved,
good effect was not permanent in all.

---

[1] [Bals. Vitæ Hoffm., see note, Vol. I, p. 106. Unguentum nervinum
Rorismarini compositum, contains rosemary, marjoram, rue, laurel, a
root, which are boiled down with lard, to which oil of rosemary a
added subsequently.]—Ed.

[2] Medicinische Zeitung des Vereins für Heilkunde, 1841, No. 37.

CHAPTER XXXVI.

PARALYSIS OF THE LESSER DIVISION OF THE FIFTH NERVE.

PARALYSIS OF THE MUSCLES OF MASTICATION.

Sir Charles Bell was the first to establish the motor functions of the lesser division of the fifth nerve, which already Vesalius, and subsequently Palletta, had recognised as a peculiar nerve, distinct from the rest of the trigeminus. We owe to him the discovery of the paralysis of the muscles of mastication, which had previously not been suspected, whilst the phenomena of facial paralysis were known to older observers.[1]

The pathognomonic character of this variety of paralysis is arrest of the movements of mastication in one or both sides of the face; the latter, however, occurs very rarely. The muscles that raise the jaw, draw it aside or downwards, singly or together refuse to do their duty. The mere appearance of the affected side is sufficient to show the nature of the malady, which is still more distinctly manifested by the touch. If the patient is made to masticate, and the physician lays his fingers on the temporal and masseter muscles, a distinct contraction and hardness is felt on one side, and an inactive and relaxed condition on the other. The patient is conscious of the obstacle; he does not chew with the diseased side, or rolls the food over to the healthy side with his tongue. During the process the jaw and the angle of the mouth assume a more or less oblique position; this is rarely observed while the parts are in a state of repose. I have not hitherto met with a case in which there was a preponderating action of the muscles of mastication of the healthy side, such as we see in histrionic paralysis of the facial. Nor have I discovered any alteration in the velum palati, although the tensor palati is supplied by a branch of the internal pterygoid. It has no as yet been determined how and whether the tensor tympan which is supplied by a branch of the internal pterygoid nerve that passes through the otic ganglion, is implicated in th paralysis. One of my patients is affected with difficulty o hearing on the diseased side; although Savarts' and Müller's researches show that tension of the tympanum deadens sound

---

[1] Forestus—Opera Omnia, vol. i, lib. x, p. 587.

When the paralysis is persistent the muscles of masticatio become paralysed; in a case recorded by Bell the left massete was so reduced and flabby that the bone appeared to b directly under the skin.

The seat of the disease is either the peripheral or th central portion of the fifth nerve; the observations of th former that have hitherto occurred have shown the caus residing at the base of the brain or cranium, as in my own cases and those given by Bell. There generally was a tumou of the dura mater, or the bone, or of the ganglion of Casse itself, compressing the nerve. On account of the close proximity of the sensory portion of the fifth nerve, there was at the same time anæsthesia of the corresponding side of the face and its cavities. This is the case with the female, whose case I have already related, and who is yet vividly before my mind. She had formerly often suffered from intermittent fevers, headache, and vertigo. Eight years ago, after a severe cold in the feet, the pain rose, especially in the left temple, to an extreme pitch; trismus supervened, and lasted six weeks, accompanied by violent pains of the left side of the face. When these remitted, paralysis of the muscles of mastication and anæsthesia of the three divisions of the fifth on the left side, remained, the symptoms of which have been elsewhere described. In addition to anæsthesia we may find other nerves implicated, which must depend upon the position and extent of the tumour.

The centric origin of the paralysis of mastication is proved by the coincident affection of other nerves of the face, the tongue, and the extremities. The centric affection of the muscles of mastication is generally confined to one side, according to the law of decussation. During the death struggle it extends to both sides; this gives rise to the falling

---

[1] Müller's Elements, &c., Dr. Baly's transl., vol. ii, 1262.

of the lower jaw, as in animals whose fifth nerve has been divided.

The greater distance of the motor portion of the fifth nerve from the surface of the face, affords it more protection from all those influences which often and easily affect the facial nerve. Morbid changes in the sphenoid bone, through which the masticatory nerve passes, are less frequent than disease of the temporal bone. This species of paralysis is induced by tumours, morbid growths and exudations at the base of the cranium and brain. The centric is more common than the peripheral form; and this serves to distinguish masticatory from histrionic paralysis; as a rule the fibres of the trigeminus, both those possessing motor, and those with sensory functions, are more liable to be involved in affections of the central organs than those of the facial and other nerves. This accounts for the frequency of sympathetic action, of neuralgic and convulsive attacks, in the range of this powerful nerve. Thus I have observed[1] one-sided paralysis of the muscles of mastication, resulting from hæmorrhage of the brain, associated with anæsthesia of the third branch of the fifth pair.

The prognosis is, on the whole, less favorable than in histrionic paralysis, on account of the seat of the disease. However, when due to a centric origin it is not so bad, as hæmorrhage in the brain may terminate in a spontaneous cure; nor are instances wanting of destructive processes in Casser's ganglion being arrested, and of the effects of the pressure of adjoining tumours having ceased. In this respect the cases communicated by Bell and Abercrombie[2] are of great interest.

As regards *treatment*, we have on the whole to pursue the same principles as those in histrionic paralysis. If we wish to apply issues, the best place to select is the vicinity of the occiput.

---

[1] Müller's Archiv für Anatomie, &c., 1838, p. 313.

[2] Pathological and Practical Researches. &c., 3d ed., p. 425.

[illegible] of which [illegible] the nerve. [illegible] The upper lid hangs [illegible] as to touch [illegible] It has lost its [illegible] the finger and let go [illegible] in his excellent obser- [illegible] points out that in [illegible] the eyes more firmly. [illegible] an alternate contraction and [illegible] follows. [illegible] be produced not only by

---

[illegible] Müller's

[illegible] Organs and Cornea, p. 242

the force of its antagonist, but also idiopathically and spontaneously.

Paralysis of the eyeball, ophthalmoplegia, is either complete or partial; in the first case, the eye is entirely deprived of movement upwards, downwards, or laterally; and remains in the position it once occupies. The only direction in which the bulb is able to turn is, as Ruete has observed, downwards and outwards. This rotation follows the segment of a small circle, which is the line in which the pupil moves when the upper oblique muscle alone acts. In performing this rotatory movement, it is necessary that the tension of the external rectus muscle of the eye, by which, in paralysis of the oculomotor, the pupil is fixed in the external angle, be overcome. But as the rectus externus is more powerful than the obliquus superior, the contraction of the latter soon remits; the consequence is, that the pupil, even against the will of the patient, after a short time rotates in the same segment of the small circle, and resumes the direction which the unopposed tension of the external rectus gives it. At the same time there is ptosis and immobility of the moderately dilated pupil. In partial ophthalmoplegia, the eye is unable to turn in a definite direction, and is drawn by the antagonist of the paralysed muscle to the opposite side; this destroys the parallelism of the two eyes, and gives rise to strabismus (strabismus paralyticus). Thus when the rectus internus is paralysed, the eye is directed to the temporal angle; to the nose when the external rectus, upwards when the inferior rectus, and downwards when the superior rectus, is paralysed. When the oblique muscles of the eye are the seat of the paralysis, the rotatory movement of the bulb is said to cease, so that when the patient is told to bend his head to either shoulder, without changing the position of his eyes, the affected eye remains fixed, and does not follow the rotations of the healthy eye.[1] The abnormal position of the eye gives rise to other phenomena; one series affect the faculty of vision; so long as the squinting eye continues to see, and the patient attends to it, binocular vision is present. Szoklaski has pointed out that a peculiar kind of overlying images is a symptom accompanying paralysis of the trochlear nerve.[1]

---

[1] Szokalski; de l'Influence des Muscles obliques de l'œil sur la Vision et de leur Paralysie; Paris, 1840.

In complete ophthalmoplegia, the bulb is not turned up under the eyelids when they are closed, as in health, and as first described by Sir C. Bell; and on this account, the patients constantly complain of luminous impressions in spite of the eyes being closed. Thus, one patient said that he saw a red light before his closed eye, another said, that the night-light caused him inconvenience.[2] The influence exerted by the immobility is not limited to the function of sight, but also influences the function of nutrition; the eye is not duly moistened by the tears, and thus inflammation and opacity of the cornea may occur. Another sequel, which rarely fails to show itself, is contraction of the antagonist to the paralysed muscle.

The paralysis of the iris, iridoplegia, is manifested by immobility of the pupil under the influence of light, the pupil being dilated (mydriasis) or contracted (myosis), the free margin remaining either normal or becoming distorted or changed in its direction.

The causes and symptoms of this variety of paralysis vary according to whether the cerebral or reflex conducting power of the nerve is involved. In the former case the loss of movement under the control of the will is characteristic. The causes either operate on the peripheral or central tract of the motor nerves of the eye.

1. *Peripheral affection of the oculomotor, trochlear, and abducens.*—A rheumatic cause, though not so frequently as in

---

[1] In one case the movements of the pupils and the recti muscles remained unaltered, but the centre of the left cornea was directed rather more downwards than it was in the right eye; at the same time there was double vision, with overlying images. When the right eye was closed, the upper image disappeared, the lower one did so when the left eye was shut. If the head was inclined to the left, the images separated more and more, when the head was inclined to the right only one image appeared. The same was the case in the other instance; there were a few injected vessels at the external angle of each eye, which served Szokalski as a guide, whilst taking hold of the head of the patient by the temples and alternately turning him to the right or the left. The affected eye remained lying at the bottom of the orbit, and followed the movements of the head; while the healthy eye performed rotatory movements in the orbita.

[2] Bell; loc. cit., p. 266.

the case of the facial, paralyses the palpebral branch of the oculomotor, and is followed by simple blepharoplegia, without implication of the muscles of the eye, and the contractile fibres of the iris, according to the law of isolated conduction. The other branches of the oculomotor are less frequently, and the abducens most of all affected by this cause. Dr. Dahling has observed a case which has been published by Stromeyer,[1] where the facial and abducens nerves of the left side were suddenly paralysed, in consequence of a current of air blowing upon the heated face. The left eye was immovably directed inwards and downwards, the right bulb was turned to the external angle of the eye, and could be returned with some effort to the axis of vision; the movement was more easily effected when the right eye was closed. This gave rise to double vision; in which the true image was above, the false one to the side of and below the other. When the right eye was closed, the patient saw the object singly. The preponderance in this case of the symmetrical muscle of the eye of the healthy half of the face, is a point of particular interest. External injuries in the vicinity of the eyelid are often followed by blepharoplegia. Tumours of the orbit occasionally compress the muscular nerves of the eye; this was the case in a young woman, observed by Shaw, suffering from a fungous tumour below the maxilla. The cheek of the same side was paralysed—the upper eyelid being down; but if raised, the patient was perfectly able to see distinctly, though the pupil was dilated and immovable. At the post-mortem, the tumour was found to have extended into the lateral part of the orbit. The trochlear nerve passed above the tumour, the oculomotor was included in its tissue, the ophthalmic branch of the fifth nerve was most disorganized, and the abducens had only suffered at a few points. The tumour did not extend to the optic nerve. The diagnostic criteria of cases of this kind are, in addition to the objective symptoms in the form and position of the eyeball, the implication of the ophthalmic branch of the fifth, which is manifested by anæsthesia of the surface of the eye and the forehead, and the integrity of the facial nerve, as shown by the persistent power of closing the eyelids. The peripheral causes of paralysis of the muscles of the eye are much more frequently seated within the cranial cavity at the base of the brain; they are most commonly sero-albuminous exudations and sanguineous extravasation; tumours give rise to it less frequently, and when they do so, they implicate the adjoining cerebral nerves more or less, according to their extent. The symptoms of a cerebral affection have generally preceded or coexist. Bell has communicated a few cases. One patient had been suffering from febricitations for a week, upon which sopor and delirium supervened. When he began to wander he lost the power of opening the right eye; on raising it with the finger, it was evident that the movements of the ball had also ceased; while the left eye rolled from one side to another, the right remained at rest, and was directed rigidly forwards. When the eyelids were held apart, resistance was felt on the part of the bulb and the orbicularis, which closed the eyelids with full power. At the post-mortem, a considerable quantity of serous fluid was found in the cerebral ventricles. The removal of the brain, which is generally accomplished with facility, was prevented by a thick layer of coagulable lymph, of a straw colour, and gelatinous consistency, which caused an adhesion between the upper part of the pons Varolii and the dura mater. This layer was most dense to the right of the sella turcica. All the nerves passing to the orbit were enveloped in this matter, and more particularly the third, which presented a brownish-yellow appearance. The corresponding nerves of the left side were also, though in a less degree, affected. The point of insertion of the facial nerve was removed from the seat of the disease. In the other case, a scrofulous boy of 11 years of age, double vision, squinting and ptosis of both eyes, had supervened suddenly. The faculty of closing the eyelids and of blinking, as well as the power of vision, were undisturbed. The left eye moved but partially, the right had a staring look; the left iris was alone moveable, the right pupil was dilated. After a few months, the condition of the patient grew worse. Pain in the right arm and in the head supervened. The muscles of the thumb wasted, and soon after the entire arm became atrophied and paralysed. The paralysis extended over the entire body. Sectio cadaveris: The ventricles of the brain contained about ten ounces of serum; the cerebral tissue was diffluent, and the serum of the ventricles contained flocculi. Several tubercles were found in the cerebellum and pons Varolii. An exudation of lymph was discovered at the base of the brain, enveloping the origins of all the nerves, from the olfactory to the ninth pair. The fifth pair were least affected; the oculomotor of the right side could scarcely be recognized in the exudation, was disorganized, and had become transparent.[1] In 1839, I was called to see a boy of 3 years, who nine months previously had had a severe fall down stairs. On the 20th of March, the disease commenced with vomiting and diarrhœa, followed by high fever and confusion of intellect. On the 22d, there were marked symptoms of cerebral meningitis, with ptosis and blindness of the left eye, which was permanently turned to the external angle, and did not exhibit the slightest reaction to the stimulus of light. The sopor became more profound, and death ensued with violent convulsions of the extremities. During the last two days, the right eye also appeared to have lost its power of vision. The pupils were dilated and immovable. On examination after death, the central portions of the brain, the corpus callosum, the fornix, the septum lucidum, and the walls of the lateral ventricles, which were dilated and filled with a quantity of serous fluid, were found softened. At the base of the brain, especially at the anterior lobes to the floor of the third ventricle, there was evidence of intense meningitis. An extensive albuminous exudation enveloped the optic nerves, the chiasma, and the oculomotor; it was most marked on the left side. Hugh Ley[2] has found that in several cases of exudation at the base of the anterior lobes accompanied by thickening of the membranes, the paralysis was confined to the superior recti muscles of the eye, and he also points out that the fibres of the oculomotor which supply these muscles, pass off from the trunk of the nerve before it traverses the dura mater, and may, from the delicacy and thinness of their neurilemma suffer from a pressure which would be insufficient to affect the larger trunk.

---

[1] Physiologische Bemerkungen am Krankenbette von Stromeyer, in — Casper's Wochenschrift für die gesammte Heilkunde, 1837, p. 97.

The following case, which has been recorded by Stumpff,[3] is with ophthalmoplegia and optical anæsthesia. Of the nerves of the ocular muscles, the oculomotor is more frequently involved in central affections than the abducens, and especially the branch supplying the rectus internus and superior; thus strabismus divergens accompanies hæmorrhages and softening, and in chronic hydrocephalus the bulbs are very often turned downwards and incapable of being elevated. Yelloly[1] mentions a case of paralysis of the external rectus, in which the bulb was turned inwards, and which was caused by a tumour of the left side of the fourth ventricle of the brain.

---

[1] Bell; loc. cit., p. 380.

[2] An Essay on Laryngismus Stridulus, p. 47.

[3] Dissertatio Inauguralis, de Aneurysmatibus Arteriarum Cerebri; Berol., 1836.

We must make a distinction between cerebral paralysis of the muscles of the eye and reflex immobility, which may be recognised by the cessation of certain movements, on account of the diminution and loss of sensory and sensual stimuli, while the movements that are under the control of the will continue. We have already had occasion to point out that the equilibrium of the movements of the eye depends upon the vigour of the optic nerve; Von Walther[2] possesses the merit of having properly estimated these phenomena occurring in the muscular nerves of the eyes, of having seen their bearing upon amaurosis, and of having properly estimated their physiological relations. The characteristic stare of the amaurotic eye is the expression of the torpidity of all the muscles of the bulb; but it is chiefly the oculomotor, and especially the branch that goes to the rectus internus, whose activity is diminished on account of the impaired vigour of the optic; amaurosis is, therefore, generally accompanied by strabismus divergens.[3] The arrest of movement more rarely affects the levator palpebræ superioris. Patients are able, through the influence of the brain, e. g., when told to do so by the physician, to move the eye, to turn it towards the nose, or to raise the upper eyelid, but although they are able to do so they do not do it of their own accord, because the stimulus of vision no longer affects them. They occupy the same position as those who labour under anæsthesia of the first division of the fifth pair, in whom the blinking of the eyelids, on the approach of foreign bodies, has ceased, although when required to do so the patient is able to close the eyelids freely, and can imitate the blinking movement. It is of consequence that the longer the reflex influence of vision upon the motor plexus is in abeyance, the less capable it becomes of receiving a cerebral stimulus; in the same way when the cerebral excitability is destroyed the reflex activity suffers. Nor should we overlook the fact that in centric amaurosis the spread of the disease to the central tracts of the muscular nerves of the eye, may deprive the latter of their power of conduction.

---

[1] Medico-Chirurgical Transactions, vol. i, p. 218.

[2] Die Lehre von schwarzen Staar und seiner Heil-Art.; Berlin, 1841, p. 75.

[3] See—Böhm's excellent Monograph, Das Schielen und der Sehnenschnitt, in seinen Wirkungen auf Stellung und Sehkraft der Augen, 1845, p. 212.

The absent reaction of visual excitement in amaurosis not only manifests itself in the muscles of the eye, but also in the contractile fibres of the iris; the pupil is generally immoveable and accompanied by a deviation of form and position. The inquiries as to the source of the movements of the iris are of considerable interest, and promise physiological results for the entire doctrine of the motor phenomena. Mayo[1] was the first to establish the influence of the oculomotor. When this nerve is irritated within the cranium, contraction of the pupils results; when it is divided, the pupils dilate. The latter has generally, but improperly, been considered as a passive condition or a state of relaxation; the experiments instituted by Petit in 1712, and subsequently confirmed by Molinelli and later inquirers, have shown that division of the cervical portion of the vagus and sympathetic in living dogs, instantly induces a permanent contraction of the pupils of the corresponding eye. The same result was obtained when Dupuy and Dupuytren divided the upper cervical ganglion of the sympathetic, so that this alone would serve to prove the existence of motor fibres passing upwards through the ciliary ganglion to the iris, to which the dilatation of the pupils may be attributed. Very recently Valentin,[2] by his experimental researches, has placed this matter upon a firmer footing. His investigations demonstrate the antagonism existing between the motor stimuli in the nervous elements of the iris that are derived from various sources, whether cerebro-spinal or sympathetic; they also show that the shape, both of natural and artificial pupils, depends upon the relation of these stimuli to one another. If the upper ganglion of the sympathetic, the ganglion of the vagus, their trunks or the fibres of the cervical nerves that unite with them are irritated, the pupil becomes dilated; if they are divided and thus deprived of their conducting power, the oculomotor acquires the upper hand and contraction ensues. The converse is also the case. These investigations assist in the interpretation of pathological phenomena. When there is cerebral irritation we find the pupil contracted, when the sympathetic is irritated, as in helminthiasis, it is dilated; paralytic affections of the brain are associated with mydriasis, while in tabes dorsalis I have found the pupil contracted to the size of a pin's head. It has not as yet been determined whether the mydriasis following the instillation of infusion of belladonna or hyoscyamus into the eye, results from paralysis of the fibres of the oculomotor or from stimulation of the sympathetic. We may trace the paralysis limited to individual nerve fibres better in the iris than in other muscles, and also determine the preponderating influence of the other healthy fibres by the disfigurement of the pupil. Valentin asserts that he has noticed definite changes in the pupil according to whether the ganglion of the vagus or the superior cervical ganglion was experimented upon. Injuries inflicted upon individual ciliary nerves in operations upon the eye, occasionally give rise to the pupil being directed upwards or inwards, or to some other quarter; the changes in the configuration of the free margin of the iris, the horizontally or vertically oval, which have been made use of to determine the diagnostic criteria of the varieties of amaurosis, can only be attributed to an unequal distribution of the paralysis of the different ciliary nerves.

---

[1] Anatomical and Physiological Commentaries; London, 1823.

[2] De Functionibus Nervorum Cerebralium et Nervi Sympathici, p. 109.

There are other states of inactivity in the muscles of the eye besides reflex immobility, which should not be confounded with paralysis. In persons whose two eyes possess a different range and power of vision, we find the motor energies less exercised; they are apt, at a medium distance, only to look with one eye, while the other eye, as it were, goes to sleep. Thus we also find strabismus accompanied by ptosis, if the eye is incapable from its altered position, of being employed for seeing. Dieffenbach[1] has observed that the affected eye could be moved much wider when the healthy eye was closed, although no improvement was manifested in the position of the pupil. We must lastly advert to the relaxation of the external rectus, which Bell[1] has shown by pathological arguments to be a frequent cause of strabismus convergens. It would scarcely be possible to explain this relaxation of a single muscle without remembering the double source from which it derives its motor powers; the one being of cerebral origin by means of the sixth pair of nerves, the other sympathetic by ascending fibres derived from the upper cervical ganglion of the sympathetic, which are in approximation with the abducens. Petit already observed, and it has been since confirmed by others, that after division of the cervical portion of the sympathetic, the eye is invariably drawn to the inner angle; while, on the one hand, the withdrawal or loss of this impulse weakens the energy of the external rectus and causes the contractile muscular tissue to relax, although cerebral conduction may continue unimpaired along the abducens; we can, on the other, easily account for the external rectus being especially implicated in affections of organs governed by the sympathetic. (Helminthiasis, Hysteria.)

---

[1] Ueber das Schielen und die Heilung desselben durch die Operation, p. 162.

The *treatment* depends; 1, upon fulfilling the etiological indication; we must proceed against the rheumatic or traumatic cause, as in other cases we should try to promote absorption and the removal of dyscrasic processes. This, however, rarely suffices to establish a cure; we must, therefore; 2, seek to restore the excitability and conducting power of the muscular nerves of the eye. It has been attempted to achieve this by the local employment of irritant and derivative measures; and beginning with aromatic and ethereal frictions, (balsamus vitæ Hofmanni, ol. cajeputi, spiritus etheris sulphurici,) and passing to the application of blisters and moxæ in the vicinity of the eye. The latter, especially white heat, belong to the more effectual agents for the cure of ptosis and ophthalmoplegia, the former, on the other hand, are generally useless. Electricity in its various modes of application, whether as electro- or galvano-puncture, or by means of the electro-magnetic rotatory apparatus, rarely produces any permanent effects. The same applies to the douche. We may expect better results from derivative remedies,[1] and issues, (emplastrum vesicatorium perpetuum, the unguentum or emplastrum antimonii potassio-tartratis,) especially when we have to deal with a rheumatic or dyscrasic constitution. I must here draw attention to an error which is kept up through ignorance of the recent progress in neurology, and is the more difficult to eradicate because it has the sanction of a celebrated name. I allude to the application of a cauterising paste between the mastoid process and the angle of the jaw, recommended by John Ad. Schmidt. This is, probably, owing to the curative powers which it is known to possess in lagophthalmus, for counter-irritation applied at this point is less effectual for the cure of paralysis of the oculomotor, than when applied in the vicinity of the eye. The endermic application of strychnine may be combined with the issue, in the same manner as in paralysis of the facial nerve.

---

[1] Practical Essays; Edinburgh, 1841, p. 62.

Surgery has of late acquired some merit in the treatment of muscular paralysis of the eye. Dieffenbach,[2] to whom science is most indebted in regard to this point, found that the slighter degrees of ptosis, which occasionally accompany squinting, disappear after the successful operation of the latter. In other more serious cases, division of the antagonising muscle, the orbicularis palpebrarum, was effectual; from this we may conclude, that in blepharoplegia, we have to do not only with paralysis of the levator tarsi, but also with an increased action of the sphincter muscle, the reverse of what obtains in lagophthalmus. In ophthalmoplegia, the division of the antagonist of the paralysed muscle acts in a similar manner; the operation of strabismus paralyticus should be valued, not only in a cosmetic point of view, but also in reference to the influence it exerts upon the maintenance and improvement of vision.

---

[1] [Empl. vesic. perpetuum, is made with one part of cantharides to fifteen parts of empl. resinæ.]—Ed.

[2] Loc. cit., p. 164.

CHAPTER XXXVIII.

PARALYSIS OF THE HYPOGLOSSUS NERVE.

The motor action of the tongue is not less comprehensive than the sensory, and equally requires elucidation. Although the difference between the masticatory and articulating movements of the tongue is more frequently manifested than in the convulsive diseases, the pathological observations hitherto made have not explained the nervous levers of this double action, as has been done in reference to the histrionic and masticatory movements of the facial muscles; nor could it be otherwise, as long as the hypoglossus was regarded as consisting of identical elements. But like all other nerves, it is only a tract in which primitive fibres of a different origin are associated; and Volkmann[1] has shown by microscopic researches, that the descending branch is an ascending one, conveying fibres from the two upper cervical nerves to the hypoglossus and the tongue.

The articulating and masticatory paralysis of the tongue occur either isolated or associated with one another.

1. *Glossoplegia masticatoria.*—The movements of the tongue are either entirely or partially arrested. The formation of the morsel in the mouth is executed laboriously, or it cannot be done at all; the food remains lying on the paralysed side, because the tongue does not move it; there is also a difficulty or inability to masticate and to swallow. Sensation is undisturbed in the uncomplicated cases; taste is more obtuse on account of the impaired powers of movement. There is generally an accumulation of the saliva that is not wanted in the cavity of the mouth. Panizza[2] was the first accurately to describe the result of dividing both hypoglossi; he says, "that the dog, after having fasted for a time, approaches the basin with milk that is placed before him with great apparent

---

[1] Müller's Archiv, 1840, p. 502.

[2] Versuche über die Verrichtungen der Nerven, translated by Schneeman; Erlangen, 1836, p. 31.

relish, but is unable to protrude the tongue in the least, so that after a few vain attempts he relinquishes it. He seizes a piece of bread moistened with milk, tries to chew it, but soon drops it, scarcely divided into two parts; he will then again seize it, till at last he leaves it broken up into small pieces. If during the movements of mastication, from the head being bent, the tip of the tongue protrudes from one angle of the mouth, it hangs out loosely, the animal bites it and utters a howl in consequence. If the mouth is opened the tongue is seen to be perfectly immoveable and lax, and it remains in any position that it may be placed in. If a piece of bread or meat be laid on the dorsum of the tongue, it remains there unless it is caused to fall out by the movements of the jaws, or is jammed in between the tongue and the teeth. Deglutition is not effected, unless perhaps the morsel reaches the cavity of the pharynx by the mere action of the pharyngeal muscles; but even in this case it is only performed ineffectually, because the morsel on being compressed by those muscles is broken up and partly returns into the mouth through the open isthmus of the fauces, which the tongue no longer closes up. The same occurs when fluids are poured into the dog's mouth."

When there is complete glossoplegia the articulation is also arrested, and the tongue lies stretched out like a wedge at the bottom of the oral cavity, behind the teeth of the lower jaw. When there is partial paralysis of the tongue, its movements and position are abnormal. Hemiplegia is the most frequent affection of the kind. The tip of the tongue, when protruded, is turned towards the paralysed side. I have recently had an opportunity of observing this phenomenon in a patient, after the extirpation of a small carcinomatous growth on the left half of the tongue, by which the fibres of the hypoglossus had been injured. It is the more marked if the facial muscles are paralysed at the same time, and the angle of the lips is drawn to the healthy side; various explanations have been offered to account for the circumstance. Bidder considers the cause of the oblique position of the tongue to depend upon the arrested contractile power of those muscles which raise the hyoid bone on the paralysed side. For if, when it is attempted to put out the tongue, the elevation of the hyoid bone is left to the muscles of one side only, the hyoid must assume a slanting direction ments of the tongue. Dr. Bennati[1] has shown its movements in singing. In singing high notes the tongue draws back and expands; in the falsetto notes the edges are raised, and form a semiconical channel. Singers who are affected with this variety of glossoplegia are consequently unable to modulate their voice in its entire extent, and, more particularly, to produce the high notes of the head—or falsetto voice. In dumbness the movement of the tongue and its function of deglutition are occasionally impaired, but in stammering they are generally unaffected.

The causes giving rise to glossoplegia very rarely reside in the peripheral distribution of the motor nerves of the tongue. A curious case of this kind, in which the nerves adjoining the hypoglossus were also affected by compression, has been accurately described by Gendrin.[2] The patient, a man aged 36 years, had three years previously been precipitated down stairs on the nape of his neck; and the accident was followed by severe pain in the neck, with increased difficulty of movement and of speech. Four months later he returned to his business, and continued to attend to it for a year, but the pains in the left side of the neck persisted and extended to the arms; the voice became hoarse and weak, and the patient grew thin. He was now admitted into the Hôtel Dieu; the left half of the tongue was atrophic, but continued in the possession of sensation and taste. Dupuytren diagnosed an affection of the left hypoglossus at its point of exit from the cranium. The patient subsequently came under the treatment of Gendrin.[3] The left half of the tongue was atrophic in a marked degree. The permanent oppressive pain at the back of the neck extended to the occiput. The nape of the neck was stiff, and the power of moving the head so much impaired, that the patient could only raise his head from his pillow by employing both hands. Six months later his condition was described as follows:—The left half of the tongue was so thin, that it appeared to consist of the laminæ of the mucous membrane only; its shape was irregular; when protruded, it curved to the left side. The pain in the neck was of a dull character when the patient remained quiet, but was augmented by every movement of the head, for which reason the patient remained constantly in the horizontal position, and when he raised himself he supported his head with both hands. The muscular power was weaker in the extremities of the left side than in those of the right: the bowels were obstinately constipated; the evacuation of the bladder was only effected by regurgitation. Memory was almost entirely extinct, and there was considerable emaciation. The sensibility of the atrophied half of the tongue was undisturbed: pricking with a needle, heat and cold, produced the same sensations on either side. Sapid substances, colocynth, salt, acetic acid, only excited a very obscure impression of taste on the atrophic half, which was not experienced for seven or eight minutes after the application was made, while they were tasted vividly on the healthy side after a minute or a minute and a half. During respiration the intercostal muscles remained inactive. Deglutition was impeded, the morsel remained in the pharynx or penetrated to the larynx, causing violent coughing. The aphonia increased. The alvine and renal discharges were effected involuntarily. Aphthæ, sopor, and pulmonary paralysis supervened, and three years after the occurrence of the injury the patient died.

---

[1] Etudes Physiologiques et Pathologiques sur les Organes de la Voix Humaine; Paris, 1833.

[2] In his translation of Abercrombie,—Des Maladies de l'Encéphale et de la Moëlle Epinière, p. 627.

[3] See Montault, in the Work by Panizza, already quoted, p. 112.

Sectio Cadaveris.—A ruptured hydatid cyst was found between the left hemisphere of the cerebellum and the medulla oblongata, out of which six hydatids had issued; two of the size of a hazlenut, the others of the size of a large pea, the largest being attached to the entrance of the calamus scriptorius. About five or six similar hydatids were retained in the sac, one of them being as large as a chesnut. The cyst extended forwards on one side, between the anterior lateral edge of the occipital foramen and the point of the os petrosum, passing out of the skull by the anterior condyloid foramen and the foramen lacerum. The portion that had issued by the condyloid foramen formed a small tumour behind the hypoglossus, which was very much smaller after the union of its roots than its fellow on the right side. That portion of the hydatid cyst which passed through the foramen lacerum formed a tumour behind the mastoid process, and extended from behind forwards, and downwards between the muscles of the neck, so that it was covered by the splenius, the sternomastoid, and the posterior belly of the digastric. In the foramen lacerum the cyst had pushed the nerves forwards. The trunk of the vagus, and especially the pharyngeal branch and the superior laryngeal, were fine and attenuated. The glosso-pharyngeus was attenuated to the last degree, and resembled a neurilemmatous sheath. The muscles of the tongue, of the velum palati, and pharynx, were atrophied on the left side, and scarcely presented a third of their normal volume; their tissue was of a whitish hue, and resembled indurated cellular tissue. The arteries distributed to these muscles were small and hard, as if obliterated. With the exception of an accumulation of clear serous fluid in the dilated ventricles, the brain presented a normal appearance. At the lower surface of the middle lobe of the liver there was an hytadid cyst of the size of a turkey's egg, containing two large hydatids.

In the following case, which I have had the opportunity of examining for a considerable period, it appears that there is a compression of both hypoglossi at their point of insertion.

A widow of 69 had suffered from violent lacerating pains at the occiput and back of the neck. These were followed by difficulty of speech and deglutition. When she came to me for advice in 1842, her speech was thick and indistinct, and difficult to understand, whether she whispered or spoke loud; the saliva ran from the overfilled cavity of the mouth; the genioglossi were paralysed, and it was with extreme difficulty that the patient protruded her tongue, which she had scarcely done when it was instantly drawn back by the styloglossi. The lateral movements were less impeded. The tongue was much atrophied, and had lost its smooth uniform appearance; its surface was covered with deep furrows, and raised in folds, which were constantly oscillating. The patient stated that her sense of touch and taste was more obtuse than formerly; but she felt the pricks of a pin distinctly, and when powdered colocynth was strewed upon the root of her tongue, she tasted it rapidly and distinctly. The temperature of the tongue was normal, and it was constantly covered with a thin white moist [illegible] pressure under the angle of the lower jaw, upon [illegible] and the lateral muscles of the [illegible]. The motility of the head, the extremities, [illegible] was in no way affected. There [illegible] of any constitutional disease. [illegible] of the neck produced no effect. [illegible] the patient was often presented to [illegible] the muscles of the tongue were [illegible] that the tongue lay in the cavity of [illegible] the front teeth of the lower [illegible] the forepart of the tongue. The [illegible] separate [illegible] increased, and the [illegible] was augmented in proportion. [illegible] ceased; mere inarticulate [illegible] the patient's daughter has learnt to [illegible] has ceased, the patient is [illegible] to push the soft morsel over the [illegible] the pharynx, and to bend the head [illegible]. It is manifest that the vagus [illegible] and at night there are [illegible] with a whistling sound. [illegible] the sterno-cleido-mastoid [illegible] energy, and an oscillation is seen [illegible]. The head can no longer be maintained in an upright position [illegible] backwards, but at once fails [illegible]. On the other hand, the motility of the extremities and the [illegible] unimpaired. The emaciation has reached an extreme point, and death from [illegible].

[illegible] causes of paralysis of the tongue are, we [illegible] spinal affections giving rise to it very frequently; they may [illegible] either of both forms of glossoplegia. When the cervical portion of the spinal cord has been injured by fracture of the vertebrae, the articulating functions of the tongue are often [illegible]; the patient is not only unable to speak con[illegible] on account of the difficulty of respiration, but he [illegible] or thick, or is entirely deprived of the power of articulation. The spinal paralysis from lead poisoning is occasionally accompanied by glossoplegia.[1]

---

[1] Tanquerel des Planches, Traité des Maladies de Plomb, [illegible] p. 62.

Affections of the medulla oblongata exert a still more marked influence.

Wilhemina K—, a girl of 22 years, who had got rid of fetid perspirations of the feet by washing them with cold water, was attacked with headache; in January, 1832, she had a severe fall in the street, striking the back of her neck against a slab of granite. She managed to drag herself home with a great effort. On relating the circumstance to her mother she could not do so with fluency, but stammered. Her urine was discharged involuntarily; the headache continued; the limbs, especially those of the right side, became paralysed, and her memory vanished. The patient every day found more difficulty in speaking; if reproached with it, she commenced stuttering to such an extent that it was impossible to understand a word she said. Her appetite became ravenous, deglutition was somewhat impaired, especially at first. Six months after the attack she was idiotic, and unable to hold the head in any position. Her power of speech had entirely disappeared, but her hearing was unimpaired; sopor supervened, and death ensued soon after, on the 24th October, 1833. The relations would only consent to the cranium being opened. A considerable amount of gelatinous fluid was found between the opaque, and thickened arachnoid and pia mater of the cerebrum; the consistency of the brain, including those parts which are usually softer than the rest, was throughout very firm and elastic. The lateral cavities were dilated to double their usual size, and full of a thin serous fluid. The rhomboid fossa of the medulla oblongata appeared to be the seat of a peculiar change. It was covered throughout, between the restiform processes, with a number of yellow warty excrescences of the size of millet-seeds, which felt rough and granular; Professor Müller and myself examined them at once minutely, and found that they rested upon the white striæ, (striæ medullares;) these may be looked upon as the roots of the auditory nerve, which in this instance was in no way affected. We were of opinion that it had originally been an albuminous exudation which had gradually assumed this form. The preparation is preserved in the University Museum in Berlin, and has been delineated in the inaugural dissertation of Otto Fischer: "De raro encephalitidis casu, deque striis medullaribus in ventriculo quarto obviis."—Berol. 1834.

Among the diseases of the brain, hæmorrhage, and more especially softening, are most liable to be followed by glossoplegia, (see the chapter on Cerebral Paralysis.) Injury to the head, narcotisation and emotions, especially anger and fright, occasionally give rise to it. It was owing to the first cause, in the following case:—

A sailor boy, aged 15, while hoisting a sail, was struck by a loose rope on the left side of his head, and at once fell down in a state of insensibility. After a quarter of an hour he recovered himself, but was found to have lost the use of the right half of his body, and to have become speechless. The tongue, when protruded, was drawn to the paralysed side. In the coverings of the left parietal bone there was a wound several inches in length, bleeding profusely and penetrating down to the bone. Three weeks after the occurrence the boy was brought to the Policlinique. The motility of the extremities had been restored, and the tongue could be moved in every direction without difficulty, but the faculty of speech was arrested; although perfectly conscious, it was only with the greatest effort that the boy was able to utter a few inarticulate sounds. The left pupil was dilated, but acted normally under the stimulus of light. The father stated, and the patient gave us to understand by his movements, that he still felt an oppression in the head, which at times increased to giddiness. The bowels were costive. Some blood was taken locally by eight leeches, applied behind the left ear, and ordered to be repeated every four days, a solution of sulphate of magnesia containing small doses of tartrate of antimony being exhibited at the same time. On the 1st of June, three weeks after the commencement of treatment, his speech returned, and on the fifth he presented himself in his 'Clinique' perfectly restored.

When paralysis of the tongue is due to a centric affection, it is rarely isolated; but commonly associated with other paralytic states, such as paralysis of the respiratory and vocal muscles, the extremities, &c.

We must distinguish from the inexcitability and the loss of conducting power of the motor nerves of the tongue, the undeveloped state of their functions in congenital deafness, or deafness that has supervened early in life, in congenital or acquired idiocy, and in dementia.

There is little prospect of cure in glossoplegia; the prognosis is most unfavorable in the variety affecting articulation. After cerebral hæmorrhage, even after the other paralytic conditions and even that of mastication have been removed, the integrity of speech is rarely restored. The treatment consists mainly in the frequent repetition of cupping, in the application of issues and setons to the upper part of the neck. Electricity may be tried. It has often been recommended to let the patient chew acrid volatile substances, but this is useless.

CHAPTER XXXIX.

PARALYSIS OCCURRING IN THE RANGE OF THE NERVES WHICH CONTROL THE MOVEMENTS OF RESPIRATION AND VOCALISATION.

THE great influence of accurate physiological investigation upon pathology has also been unequivocally manifested in the reform that has been effected in the doctrine of the paralytic affections of the respiratory muscles. The collective terms, asthma and suffocative catarrh, served to conceal the scanty facts and to envelop them with confused ideas. It is only since Le Gallois and Flourens have demonstrated that the medulla oblongata is the seat of the respiratory energies, that we have been able to explain the form of asphyxia which has a central origin. More recently, the results obtained by Le Gallois' experiments on the vagus have been used to explain the paralysis of the internal muscular apparatus of respiration; Hugh Ley[1] has done so in the most comprehensive manner, while it was Bell who gave the first impulse to the study of the paralysis of the respiratory muscles of the trunk, which have since been developed by Stromeyer.

Paralysis of the branches of the vagus supplying the muscles of the trachea.—To render the subject more intelligible, it may be well to premise:—1. That Volkmann, Reid, Longet, and others, agree that the superior laryngeal nerve exerts no influence upon the respiratory movements of the glottis, but that this function is to be attributed to the recurrent branch of the vagus. 2. That according to Longet's experiments upon larger animals, irritation of the pulmonary branches of the vagus produces contraction of the muscular fibres of the bronchi. 3. That the want of breath is not felt by the aid of the vagus, as Brachet, whose experiments prove to be very untrustworthy, has erroneously asserted. Volkmann's experiments show, that an animal whose vagi have been divided, does not, as Brachet states, die quietly when deprived of air, but manifests the most indubitable symptoms of suffocation and the same phenomena as an animal in whom the pneumogastric nerves have been left entire.[1] 4. Reid, whose experiments may serve as models of philosophical inquiries, found that sudden and violent fits of dyspnœa occurred after division of the vagi at the middle of the neck, and after the movements of the glottis had ceased; and that, unless they terminated in asphyxia, they ceased after a couple of minutes. As long as the animals were at rest, or only moved about slightly, they breathed with facility; but as soon as they exerted themselves, or were forced to breathe with more vigour, attacks of dyspnœa supervened, which were at once arrested if they were restrained from the exertion, or if the trachea was opened.[2] 5. When one vagus only is divided in the experiment, a disturbance of respiration is manifested. The respiration of a dog whose vagus was touched with a forceps, became laborious and sonorous. Galvanising the recurrent branch or pinching it with the forceps caused the arytenoid cartilages to approach one another, and the orifice of the glottis to close.[3] 6. Beside the direct effects, we must also attend to the secondary consequences, the changes taking place in the lungs and the blood. The lungs generally become gorged with dark blood, their parenchyma condensed, and an accumulation of spumous serum is found in the bronchi, even if respiration is maintained by means of a tube introduced into the trachea. The venous blood that circulates in the arteries is deprived of its property of stimulating the central organs of the nervous system, especially the medulla oblongata; coma and convulsions result. Marshall Hall has directed attention to this subject as a source of secondary asphyxia and death, after the animal or the human being had already been withdrawn from the injurious influence and had recovered itself.[4]

---

[1] An Essay on Laryngismus Stridulus; London, 1836, p. 406.

---

[1] Müller's Archiv, &c., 1841, p. 334.

[2] Reid's Experimental Investigation into the Functions of the Eighth pair of Nerves; Edinburgh Med. and Surg. Journal, vol. li, p. 273.

[3] Reid; ibid., p. 140.

[4] Marshall Hall—On the mutual relations between Anatomy, Physiology, Pathology, and Therapeutics, and the Practice of Medicine; London, 1842, p. 47.—See also Reid; On the Order of Succession in which the Vital Actions are arrested in Asphyxia, in Edinburgh Med. and Surg. Journal, No. 147.

[illegible]

[illegible] accompany [illegible] prevail in each case to a greater or less extent. They may be summed up as follows: Attacks [illegible] almost [illegible] whispering cough, hoarse noises [illegible] resembling those [illegible] in the lungs, [illegible] audible [illegible] from the throat, without any sense of [illegible] of the breath. These paroxysms come and go, according to the greater or less want of air felt by the patient; they generally are associated with other symptoms which depend upon the pressure exerted by the swollen glands upon the blood-vessels, such as oedema, a pale, almost livid complexion, or upon tubercular deposit in other organs, and especially in the lungs. At the *post-mortem* investigation we find both the trunk of the vagus and its branches, the recurrent and the pulmonary nerves, encircled by the degenerated glandular mass, compressed, flattened, thin, transparent, atrophic, or so entirely fused with the mass, that it becomes impossible to trace the nervous fibres. Wrisberg[1] was the first to mention the occurrence of this condition in a scrofulous boy; "Some of the bronchial glands," he says, "were converted into very hard bodies, and surrounded the eighth nerve, where it descends into the right side of the thorax, and is about to send off the recurrent, in such a manner that I found it impossible to separate it from the mass. The same happened to the phrenic of the same side. At the division of the bronchi, there was a tracheal gland of almost stony hardness; not even a trace of the pulmonic plexuses derived from the eighth nerve were to be found passing through these osseous concretions." Since the time of Wrisberg, Becker,[2] and especially Hugh Ley, have established the character of these conditions, both by their descriptions and their delineations. Among several cases which have fallen under my observation, one of which I have already communicated, there was one of peculiar interest which occurred in a girl of five years, who was idiotic, unable to speak, and much retarded in her growth, and whose lower extremities were paralysed. Her cranium was small, the anterior and posterior fontanelles were open, the thorax compressed at the sides, the abdomen very prominent, and the limbs rickety. For two months past she had almost entirely lost her voice; and a crowing cough in short fits and accompanied by extreme dyspnœa, had supervened. Her breathing was noisy and hissing, as if there were a mechanical impediment in the larynx. The sound of the left side of the thorax was dull on percussion. In the greater part of the right lung no vesicular breathing was heard. A remission of the symptoms was ascribed to the remedies employed, but they soon returned with additional force, violent hectic fever supervened, and death ensued from suffocation. The post-mortem which took place on the 13th December, 1841, showed a conglomeration of tumid bronchial glands in the vicinity of the bifurcation of the trachea, of an oval shape, an inch and a half long and an inch broad; they pressed upon the trachea anteriorly, superiorly upon the right bronchus, and upon the vagus of the same side, the corresponding recurrent being so firmly adherent to the tumour that they could not be separated. At the posterior surface at the bifurcation of the trachea, was a heart-shaped indurated bronchial gland of the size of a hazel-nut. On dividing it, tubercular matter was found imbedded in the hypertrophied gland tissue, and in some parts the former was softened. The larynx and trachea were normal, excepting a considerable reddening of the mucous membrane in the vicinity of the bifurcation and in the bronchi. The right lung was filled with crude and softened tubercles, and in its centre was an excavation of the size of a plum. In the left lung there were only a few tubercles, as well as on the surface of the liver and in the parenchyma of the spleen. The mesenteric glands were hypertrophied and tubercular. The mesenteric glands were unusually thin and full of blood; the volume of the brain was very small, its consistency was firmer than usual. The lateral ventricles and the third ventricle were dilated, and filled with serous fluid to the amount of about four ounces. A tubercle of the size of a pea was found at the posterior end of the right corpus striatum. The dimensions of the skull were all very much reduced, and the foramen magnum especially so.[1]

---

[1] Commentationes Medici Argumenti; Götting. 1800, vol. i, p. 144.

[2] De Glandulis Thoracis Lymphaticis atque Thymo, Specimen Pathologicum. Berolini, 1826.

We generally find the vagus of one side only affected by tumefied and indurated glands; or if both are involved, one is more implicated than the other. The younger the individuals, the more imminent the danger from the suffocative attacks; in the same way we see that asphyxia occurs the more rapidly in animals the earlier the period of life at which the vagus is divided. Several corroborative cases are adduced by Ley,[2] and one instance of this kind has been accurately described by Mr. Günther[3] as having occurred in his own child, an infant of eight months. One of the attacks of asphyxia which this child passed through had the longest duration of any that ever came to my notice; the circumstance is thus related: the child had drunk several times during the night, and had then again quietly gone to sleep; suddenly it emitted a short piercing scream and ceased to breathe. The mother flew to its assistance, but the child was rigid and did not show the slightest trace of life. The next moment the father was at the bedside, and found the child lifeless, no limb moved, not the slightest respiratory effort was perceptible. The pale face was dreadfully disfigured, the eyes expanded and distorted, the tongue was protruded, the entire body was almost cold, and the heart and the pulse had ceased to beat. The head was washed with naphtha: spirits of ammonia were rubbed into the scrobiculus cordis, the abdomen, the feet, and the back, and vigorous friction was made with hot woollen cloths. These attempts to restore life were continued from twenty to twenty-five minutes uninterruptedly, when the muscles, which were all extremely rigid, relaxed, a croaking expiration took place, and at last the child began to scream loudly, though for some time with a groan. Subsequently the asphyctic attacks gave way to a cough, which occurred in paroxysms, and resembled hooping cough, a viscid white mucus filling the mouth, was expectorated with jerking expiratory efforts. These paroxysms of cough became fewer; mucous rattles, and a true phthisical cough, with much thick mucous expectoration, supervened; the child became more and more exhausted, until death closed the scene. The thymus was normal. A tumour of the size of a walnut lay upon the right vagus, obliquely opposite to and rather below the thymus, at the point where, at the external side of the vagus, the lowest cervical ganglion of the sympathetic lies. This large hard tumour, which was evidently a degenerated bronchial gland, surrounded the vagus in such wise, that the trunk of the nerve and the inferior laryngeal passed through the posterior part of the tumour, and required to be dissected out of the somewhat loose cellular tissue, which could not be done completely without injuring the sheath of the nerve. In both lungs there were a number of tubercles and several excavations, the mesenteric glands were swollen, and the surface of the spleen was covered with numerous small tubercles.

---

[1] The reader is referred to Romberg's Klinische Ergebnisse, for the details of other cases.

[2] Loc. cit., pp. 39, 40, 139.

[3] Schmidt's Jahrbücher, vol. xxv, 1840, p. 60.

Although infancy is peculiarly prone to scrofulous affections of the cervical and bronchial glands, the pressure of which interferes with the conducting power of the vagus, the later periods of life are not exempt. Andral[1] describes an instructive case of the kind: the patient, a man aged 24, for some time affected with painful lymphatic tumours on both sides of his neck, suffered from paroxysms which indicated an organic affection of the heart; the face was swollen and livid, the lips and alæ nasi were blueish, the eyelids were œdematous, there was ascites, and short accelerated respiration, during which the movements were almost confined to the ribs; the patient could not lie down owing to imminent suffocation, and he maintained a semi-erect posture in bed, with his head and trunk well supported. For a year past the dyspnœa had been on the increase, but it was augmented still more in damp, rainy weather. The percussion of the entire chest was sonorous. At some parts mucous bubbling, at others sibilant noises were heard, but throughout there was a strong normal respiratory murmur. Whenever the patient attempted to leave his bed respiration became laboured. Death ensued during a violent attack of orthopnœa. At the post-mortem the heart and lungs, excepting a few miliary tubercles in the latter, proved to be healthy. A considerable number of tuberculated lymphatic glands were found in the anterior mediastinum; and the two phrenic nerves passed through them, being so encircled and compressed, that they could not be distinctly traced within the mass. From the point of exit to their distribution in the diaphragm, they presented a grey hue. At both sides of the neck, from the edge of the lower jaw to the clavicle, a considerable heap of tuberculated glands was found, several of which lay between the vessels and nerves of the neck. A few inches below the point at which the superior laryngeal nerve was given off, the vagi disappeared in these masses, from which they were only disengaged immediately above the clavicle, much flattened. The peritoneal cavity contained a quantity of serous fluid. A mass of tuberculated glands lay before the spinal column, which on one side compressed the vena cava, on the other the vena porta.

---

[1] Clinique Médicale, 3me édit. vol. iii, p. 263.

Besides the glands the large arteries within the thoracic cavity and in the neck, the arch of the aorta on the left, and the anonyma and subclavian artery on the right side, may, when affected with aneurism, compress the vagus, and more particularly the recurrent branch. In this case symptoms would result which might erroneously be attributed to a compression of the windpipe, viz. attacks of dyspnœa, amounting almost to suffocation, and increased by movement, paroxysms of coughing, with mucous or sibilant râles.[1] In this way aneurisms occasionally induce the fatal termination suddenly, without rupture or occlusion of the trachea having taken place.[2] Tumours of the thymus rarely,[3] and those of the thyroid still less frequently, give rise to compression of the vagus or recurrent branch. Morbid growths in the vicinity of the trachea or the thoracic cavity, occasionally exert this effect. A case of this description has been published by Montault;[4] the patient suffered from constipation, sickness, and vomiting, while the tongue remained clean; he was pale and sleepless, had a variable pulse, frequent cough, with a croupy sound, and mucous bubbling throughout the thorax; and suffered from suffocative fits. At the post-mortem an encephaloid tumour was found to proceed from the bronchial glands, one portion of which compressed the cardiac nerves between the pulmonary artery and the arch of the aorta; another the right recurrent; a third was fused into a mass with the left recurrent; and a fourth rested upon the anterior portion of the trachea. Becker communicates a case in his Treatise, in which the tumour had given rise to atrophy of the right vagus, so that it looked rather like a membrane than a nerve. In Hasler's 'Dissertatio Inauguralis de Neuromate,' (Turici, 1835,) we find a case described which occurred in the practice of Professor Schönbein; a female, aged 20, fell into the water while much heated, and was in consequence attacked by paraplegia. At the right side of the neck a tumour, which was freely moveable, projected under the sterno-cleido-mastoid muscle. During the illness, which lasted five months, a violent asthmatic attack recurred four times a day, accompanied by an overpowering sense of anxiety; tumultuous movement of the thoracic and abdominal muscles; palpitation of the heart; icy coldness of the extremities; speechlessness, with undisturbed intellect, and a livid complexion. Death carried the patient off during one of these attacks. On the right side, a neuroma of the first cervical ganglion of the sympathetic, 4 inches 2 lines long by 5 inches broad, presented itself, compressing the vagus, which presented several tumefactions in its course. At the upper part of the spinal cord, and under the cerebellum, there were several tumours resembling in structure the neuroma of the sympathetic.

---

[1] See a few Cases by Graham and Alison, in—Edinburgh Medical and Surgical Journal, April, 1835; Cruveilhier, Anat. Pathol., livr. iii, pl. iii.

[2] See Lawrence; in Med.-Chir. Trans., vol. vi, p. 227.

[3] Hugh Ley; loc. cit., p. 469.

[4] Journal Univers. et Hebdom. de Médecine, &c., vol. ii, p. 73.

It is not to be forgotten, however, that tumours occur in the vicinity of the vagus, without in any way impairing its functions; the less impediment they meet with in their advance, the less pressure there will be upon the nerve; for this reason large, prominent tumours of the neck, are rarely accompanied by paralytic symptoms, while they are caused by smaller tumours which lie more deeply, and are exposed to the contractions of adjoining muscles. The functions of the vagus are scarcely affected when it passes over the tumour; for a gradual distension of the nerve fibres, unless an inflammatory or softening process exists, neither disturbs the sensory nor the motor energy, as my own experiments and those of other inquirers have demonstrated. But even if the conduction of the vagus is arrested, respiration can continue as long as no great respiratory effort is required. For in quiet breathing the movements of the glottis, as Le Gallois was the first to describe, are almost imperceptible. The vocal cords enclose, as Mayo's observations upon suicides have shown, a triangular opening; it is only when deep inspirations are made, and the breathing becomes laboured, that the pressure of the atmosphere closes the edges of the glottis, and prevents the entrance of the air, when the muscles that open the chink have lost their motor power. This explains the paroxysmal character of the dyspnœa, and the imminent suffocation, although the compression is permanent.

Comparative pathology affords an instructive illustration of the subject under consideration, in a disease not unfrequently occurring in horses, the characteristic symptoms of which are the following: When the animal is standing at rest, breathing is undisturbed and noiseless; the number of respirations are the same as in the healthy animal, the pulse is normal, and the conjunctiva as well as the mucous membrane of the mouth and nares are pale and moist. When the animal moves respiration is at once accelerated and impeded; inspiration is loud, harsh, and rattling, on which account the disease has been termed roaring. Perspiration breaks out over the whole body; there is an anxious look; the mucous membrane of the nose is reddened; the horse is only able to move slowly and laboriously. If it is allowed to stand still for a time, the dyspnœa and the noisy respiration at once cease, and all the functions return to the normal condition. But if such horses are forced into violent exertion, made to gallop, or to drag a heavy cart, their respiration becomes more laboured and louder, so that they can be heard at a considerable distance; the number of their respirations increases six and eight fold; the pulse becomes very quick, small, intermittent; the nostrils are widely dilated; the mouth is open; the eyes stare; the horse totters and trembles, and if forced to go on, it breaks down in a suffocative condition. Death appears to be close at hand; but even now, if allowed rest, the animal again becomes unembarrassed; the other functions very rarely suffer, the appetite is good, the excretions are regular, nutrition is unimpaired. A few important symptoms are discovered on exploration, which may in future be partly used for diagnosis in man. The paralysed side of the larynx may be more easily pressed inwards than the healthy side; the disease, it may be observed, almost always occurs on one side only; it is generally on the left, and but exceptionally on the right side. If we press the left arytenoid cartilages with a certain force, and for several minutes, while the larynx is fixed on the right side and below, we are able to produce the same difficult and noisy respiration as we find resulting from exercise. If we exert the same pressure on the right cartilage these attacks do not take place; but if the arytenoid cartilage of the healthy side is compressed so firmly that it is placed as if the glottis were closed, respiration is at once arrested, because its fellow, owing to the paralysis of the muscles, is unable to raise itself.

If the hand is introduced into the pharynx down to the larynx, we find the glottis placed obliquely to the right, and the right fold is tense, while the left one is relaxed. When such horses are examined after death, morbid charges are found in the vagus, before it gives off the recurrent, or in the recurrent of the paralysed side only. Dupuytren[1] found these nerves compressed by swollen and hardened lymphatic glands, and morbid growths. Günther,[2] who has the merit of being the first to describe this disease accurately and well, found the recurrent nerve of the left side in six cases much atrophied and dried, without any compressing cause, while the nerve of the right side was perfectly normal; at the same time, all the muscles supplied by the recurrent, and destined to open the glottis, the crico-arytenoideus posticus, the crico-arytenoideus lateralis, the thyro-arytenoideus, superior and inferior, and the left half of the arytenoideus transversus, were found very much atrophied, pale, and flabby. These observations have been confirmed by the Professors of the Veterinary School at Berlin, Gurlt, and Hertwig.[3] It is not long since, Gurlt showed us a preparation in the veterinary museum, in which the recurrent, to the extent of about an inch and a half, is atrophied, half the thickness of the one of the right side, and not of a pure white, but of a dirty grey colour. The muscles just named have almost entirely disappeared, and are converted into fatty tissue. Percivall states, in the 'Veterinarian' for 1840, that Field produced respiratory paralysis artificially, by cutting a piece an inch and a half long out of the right recurrent; that he kept the horse alive for four years, and at the post-mortem found all the muscles dependent upon the recurrent atrophied in an extreme degree. This disease has been observed by Trousseau to be caused by lead poisoning in horses, who worked in a minium manufactory.[4] Dupuytren attributes it to epidemic and miasmatic influences; others to the consumption of a plant much cultivated in the south of France, the latyrus ciceræ;[5] and Günther is of opinion that it is owing to a metastatic process occurring in the epizootic nervous fever of horses. It is only in recent cases of the kind, that derivative treatment by means of setons, issues, cantharides, and tartrate of antimony ointment, are likely to prove serviceable; the horse should at the same time be placed in the most favorable circumstances as regards air and diet. After the disease has existed for some time, or if the causes are not to be removed, a radical cure is impossible. The operation of tracheotomy is a palliative proceeding, by which the horse may be kept alive for years, provided the orifice be kept open afterwards.

---

[1] Journal Général de Médecine, Avril, 1821.

[2] Untersuchungen über den Pfeiferdampf oder die sogenannte Hartschnaufigkeit der Pferde, in—Zeitschrift für die gesammte Thierheilkunde und Viehzucht, vol. i, p. 267.

[3] See the Treatise and Plate by Hertwig, in the—Magazin für die gesammte Thierheilkunde, 1841, No. 1, p. 98.

[4] Froriep's Notizen, 1827, No. 378.

[5] Renault, in the Veterinarian, vol. viii, p. 32.

There are a few more symptoms to which we must briefly allude; one is the alteration of the voice, from a rough coarse sound to complete aphonia, of which almost all authors have spoken; there is another which requires to be yet further investigated, it is the anæsthesia of the trachea. Even during health the sensibility of the trachea varies; it is most marked at the glottis and in the larynx, which parts are supplied by the laryngeal nerve; the terminal branches of which are very rarely involved in glandular tumours or other morbid influences; for this reason the sensibility at the entrance of the windpipe, which serves to protect the entire respiratory apparatus, continues unimpaired. The outlet of the trachea, the bronchi, are endowed with a lower degree of sensibility; they are capable of conveying an impression of repletion when charged with mucus and other fluids. When the vagus and the pulmonary branches given off by it, are compressed by bronchial glands, this is not the case; mucous rattling is heard at a considerable distance, while the patient experiences no inconvenience. The trachea is least sensitive of all these parts, as proved by the notorious manipulations in tracheotomy, the brushing and cauterisation of the trachea, recommended by Trousseau in croup. As to the consecutive changes that take place in the parenchyma of the lungs when the vagus is paralysed, too few careful observations have been made on the subject in man to state anything positively on the subject. The repletion of the vessels, the congestion, and the accumulation of exuded matters, are generally considered as symptoms of bronchitis; and the vesicular emphysema and the dilatation of the bronchi, which are found complicated with scrofulous affections of the bronchial glands after hooping cough, are treated as sequelæ of this affection. But the dilatation of the pulmonary vesicles and the bronchi themselves may probably be more justly considered as a result of paralysis of their contractile parietes.[1]

II. PARALYSIS OF THE CENTRAL PORTION OF THE VAGUS.

Lesions and diseases of the medulla oblongata arrest the respiratory functions of the vagus. The sudden death resulting from pressure, bruising or laceration of the medulla oblongata, caused by luxation and fracture of the first two cervical vertebræ, are well known in the annals of surgery. Hæmorrhage into the medulla oblongata, of which Ollivier[2] has communicated a few instances, is followed by similar consequences; the asphyxia of new-born infants is often due to extravasation of blood upon the external surface of the cerebellum, the medulla oblongata, and the spinal cord.[3] Chronic compression of the medulla oblongata by aneurismatic and other tumours, is accompanied by paralytic affections of the muscles of respiration; a case is detailed in Ollivier's work,[4] in which the pyramids were destroyed, and the points of insertion of the vagus, glosso-pharyngeus and hypoglossus, were compressed by an aneurism of the basilar arteries. There was dyspnœa amounting to suffocation, aphonia and difficult articulation, combined with paralysis of the extremities. Disease of the bones may paralyse the motor energy of the vagus, as it does the sensory powers, by the pressure, &c., being propagated to the origin of the vagus; symptoms of this kind are associated with every death proceeding from the brain.

We can only expect any good result from treatment in the peripheral paralyses of the vagus, when there is a possibility of getting rid of the cause, and if the structure of the nerve has not become impaired. When we have to do with scrofulous affections of the cervical and bronchial glands, cod liver oil, the preparations of iodine, country air, sea and salt baths are indicated. When there is disease of the upper cervical vertebræ, a spontaneous cure sometimes, though rarely, takes place, and it may be promoted by issues.

---

[1] Consult Henle's Abhandlung über Tonus, Krampf und Lähmung der Bronchen und über Expectoration, in—Zeitschrift für rationelle Medecin, vol. i, p. 271.

[2] Traité des Maladies de la Moëlle Epinière, 3d edit., vol. ii, p. 139.

[3] Cruveilhier; Anat. Pathol. du Corps Humain, livr. xv, pl. i.

[4] Vol. i, pp. 455—464.

CHAPTER XL.

PARALYSIS OF THE SPINAL NERVES SUPPLYING THE RESPIRATORY MUSCLES OF THE TRUNK.

The oldest neurophysiological experiments on living animals relate to this form of paralysis; Galen[1] divided the cervical and dorsal portions of the spinal cord at different points, in order to show his pupils the paralysing influence thus exerted upon the intercostal muscles and the diaphragm. The later experiments of Le Gallois, Flourens, and others, only differ from these by being executed with greater precision; the merit of having instituted experiments upon the peripheral distribution of these nerves belongs to that incomparable man, Sir Charles Bell,[2] who selected the phrenic and accessory nerves for this purpose.

The paralytic affections of the spinal nerves supplying the respiratory muscles of the trunk, are distinguished from similar conditions of the vagus by the extreme rarity with which they are caused by morbid states of the peripheral distributions; they are almost invariably due to an affection of the central organ. The conduction is interrupted in the spinal cord; either the cerebral or the reflex conduction, or both together, being arrested. The latter is most frequently the cause when lesions, and especially fractures of the vertebræ, have taken place; these, like experiments upon living animals, which are certainly the most distressing that we can perform, afford uncomplicated results, whereas in diseases the accuracy of the phenomena is always more or less clouded by the complications that are present. The parts of the respiratory organs paralysed under these circumstances, correspond to the height at which the lesion has been inflicted; if the injury is inflicted above the insertion of the phrenic nerves, death generally ensues too rapidly to allow of any observation being made. Bell[1] describes a soldier who was wounded in this manner and survived half an hour. The movements of respiration were only effected by the muscles of the neck and shoulders; at every inspiration the head was drawn down between the shoulders. The diaphragm did not move; when the hand was laid upon the scrobiculus cordis, no movement was perceived in the abdominal viscera. If the lesion has taken place lower down, in the vicinity of the lower cervical or upper thoracic vertebræ, the intercostal muscles and the expiratory abdominal muscles lose their motor power, whereas the expanding muscles of inspiration (the diaphragm, the serratus anticus, the sterno-cleido-mastoideus, the trapezius,) continue in the possession of this function. Inspiration takes place in short quick snatches, during which the contractions of the serratus may be distinctly felt if the fingers are spread out on the thorax. Expiration and every movement connected with it is incomplete, as it is not effected by muscular contraction, but by the elasticity of the ribs and the abdominal parietes, as well as by the pressure of the abdominal viscera against the lower surface of the relaxed diaphragm. This is the cause of the inability to cough or expectorate, to speak loudly, to sneeze, to blow the nose, or to strain, and of the increase of the dyspnœa in the erect, sitting posture, because this prevents the pressure of the abdominal viscera against the diaphragm. Similar phenomena are sometimes met with in inflammation of the cervical vertebræ, they continue while the disease lasts and cease with it;[2] whereas, in fractures of the cervical vertebræ, life rarely continues beyond the sixth day, and is generally extinct a few days after the injury. In rare cases paralysis of the respiratory muscles of the trunk supervenes upon paralysis of the superior extremities in lead poisoning; the thoracic parietes are much sunk, and death ensues from asphyxia.[3]

---

[1] De Anatomes Administrationibus, lib. viii, cap. ix.

[2] The Nervous System, &c., 3d ed., p. 115.

The isolated loss of cerebral conduction, or of spinal reflex conduction in the nerves of the respiratory muscles, becomes very perceptible in morbid conditions. In the former case there is an inability to execute voluntary movements with the same muscles, while they are capable of executing their respiratory functions, *e. g.*, the muscles that move the scapula. A person affected with hemiplegia resulting from cerebral disorganisation, is unable to raise the shoulder on the paralysed side at will, to depress it or to approach it to the vertebral column; on the other hand, when the respiration is hurried, if the diaphragm is compressed or the nostrils are closed, no difference is perceived in the rise or fall of the shoulder blades.

---

[1] Loc. cit., p. 124.

[2] Bell, loc. cit.; and Bright, in Guy's Hospital Reports, vol. ii, p. 296.

[3] Tanquerel des Planches; Traité des Maladies de Plomb, vol. ii, pp. 61, 130, 140.

When the spinal conduction is impaired, one or more muscles refuse to co-operate in respiration, but obey the influence of the will. An increase in the want of respiration, produced by compression of the abdomen, gives distinct evidence of the respiratory inactivity of the muscles, in consequence of which the form and expansion of the thorax, which depend upon the tone and the respiratory vigour of these muscles, undergo an alteration. Stromeyer's investigations and experiments were the first to give any information on this subject.[1] He excised a portion of the posterior thoracic nerve in a young rabbit, as high as possible, and even three days after a marked diminution was observed in the corresponding half of the thorax. This increased daily, so that a fortnight later it was shown by measurement that there was a difference amounting to five or six lines. The experiment was repeated on another rabbit with the same result. In man the serrati antici, which are supplied by this nerve, are the main seat of immobility, in which other muscles, and especially the trapezius, participate as the disease progresses. The phenomena vary according to the greater or less resiliency of the osseous structures, or according as one or both sides are affected. In infancy, and even in youth, the vertebral column becomes distorted, the vertebræ following the traction exerted by the muscles of the healthy side; they do so the more rapidly the younger the child is.

If the disease lasts any length of time, and affects only one side, it is thus that scoliosis results. The shoulders have an unequal height; one scapula is lower than the other; and its inferior angle, which normally abuts on the eighth rib, is found below the level of the tenth rib. The dorsal vertebræ are slightly rotated on their axis, and form a lateral curvature, the concave edge of which is directed towards the depressed shoulder. The corresponding anterior half of the thorax has sunk, being drawn inwards and downwards by the diaphragm, and does not respire, a fact of which it is easy to convince one's self, if the muscles of inspiration are advisedly excited to increased action. The voluntary movements take place, although the scapula retains its oblique direction to the vertebral column, and the sunken side of the thorax does not rise as perfectly as its fellow. If the respiratory muscles of both halves of the thorax are the seat of the disease, we shall find the thorax flattened at the sides, and in early childhood we not unfrequently find the sternum and the bent costal cartilages strongly projecting, giving rise to the so-called chicken-breast, or pectus carinatum. The inferior margin of the thorax is in this case also drawn in, causing the abdomen to appear more voluminous and distended. In such cases the breathing becomes laborious, and is rendered still more so by movement or exertion. Occasionally the disease first appears in this shape; and subsequently, when the muscles of one thoracic half have recovered their activity, is converted into paralytic scoliosis. If the affection lasts a long time, the muscles become atrophied.

---

[1] Ueber Paralyse der Inspirations Muskeln, in—Casper's Wochenschrift, 1837 p. 51.

In advanced life the secondary change of form does not take the shape of scoliosis and chicken-breast, but owing to the paralysis being confined to the serratus anticus, is limited to a change in the position of the scapula, which stands off from the vertebral column and the ribs, and assumes a direction outwards and forwards. The patient is no longer able to raise the arm with the same facility as previously. In rare cases, a contraction occurs at the same time with an elongation of the thorax, and it is a matter of peculiar interest that the disease often presents itself in paroxysms. A case of this kind, observed by Shaw, has been communicated by Stromeyer:[1] the patient, a man of 28 years, of robust athletic conformation, complained that he was unable to expand his chest freely in breathing. On examination, it proved that the ribs, and especially the inferior ones, were drawn in and peculiarly distorted, compressing the thorax like a bandage, and causing a rotundity of the abdomen like that of old people. The thorax retained this shape both in inspiration and expiration; if the patient took a deep breath, the ribs remained immoveable and no expansion or elevation of the thorax whatever was visible, and the patient at the same time experienced a pain in the chest. Every inspiration was accompanied by a peculiar grunting noise in the stomach and intestines; all the external muscles of the thorax and shoulders, which aid the diaphragm in respiration, remained inactive notwithstanding the efforts of the patient, whereas during expiration the abdominal muscles were felt to contract vigorously, if the hand was placed upon the abdomen. If pressure was applied with some force, it arrested respiration. When he sneezed he felt a pain as if the chest would burst. He was unable to move rapidly and to go up stairs; his dreams were heavy, and he often woke up half-strangled. The muscles of the neck and thorax, which were inactive in breathing, retained their usual energy for all other movements, such as raising or bending the head or the shoulders. The disease occurred in distinct paroxysms, continuing for a fortnight at a time; at the time of observation the patient was suffering from his fifteenth attack. In the interval the chest expanded well, and presented the normal capacity, nor was the abdomen so much distended. The first attack came on in consequence of the patient's galloping over a dyke, while convalescent from a violent inflammation of the abdomen by which he had been much reduced. The paroxysms generally returned when he approached the sea-coast, and disappeared when he removed inland. The patient was first purged with calomel and colocynth given three times a week; after this he was treated with a tonic containing muriatic acid, frictions of the thorax with a hot solution of muriate of ammonia, and a cataplasm of belladonna. In twenty days he was completely restored. The following are the measurements taken at two different periods:

---

[1] Loc. cit., p. 26.

28th October.—Circumference of thorax round the xyphoid process, 28¼ inches.

10th November.—33¼ inches; difference 5 inches. Circumference of thorax above the nipples, on the first occasion, 31½ inches; the second time, 34¼ inches; difference, 2¾ inches.

In hysterical subjects I have found dyspnœa caused by similar circumstances; they appeared to me to form a contrast with the dyspnœa of pulmonary emphysema; in the latter there is a contradiction between the violent efforts of all the muscles of inspiration and the incapability of filling cells already distended with fresh air; in the former the air enters without any impediment into all the channels, while the muscles that expand the chest cease to co-operate to that end. Physicians have hitherto only directed their attention to the heart and lungs in cases of dyspnœa: they will, in many cases, be likely to obtain valuable information by attending to the movements of the thorax.

The most fertile sources of the present affection are: the predisposition afforded by infancy and by the female sex, especially during the period of puberty; rhachitis, anæmia, debilitating influences, hooping-cough, and derangement of the catamenia.

In selecting our treatment, we must first attend to the cause, and then seek to augment the voluntary conduction in the nerves of the muscles that have become inactive in respiration. This indication is best fulfilled by gymnastic exercises, and especially by suspending the body by the hands, by which means we induce an action in the serratus magnus. Gymnastics in themselves stimulate and invigorate the muscles of respiration, as shown by the increase in the circumference of the thorax which takes place after a few minutes.[1] Swimming is likewise much to be recommended; we must also try to restore the reflex action by exciting the sensory nerves; this may be done by frictions with a solution of liquor ammoniæ in alcohol (℥j to ℥vij), or the mistura oleoso balsamica,[2] by shampooing, the douche, electricity, sea or salt baths.

---

[1] Stromeyer; loc. cit., p. 312.

[2] [Sive Balsamus vitæ Hofmanni. See Note, vol. i, p. 106.]—Ed.

CHAPTER XLI.

PARALYSIS OF THE VOCAL NERVES.

ALTHOUGH the voice is formed by the vibrations of the cordæ vocales in the larynx, the surrounding parts, through which the air passes, exert an essential influence upon the modification of the sounds. The prefixed tube of the larynx (Ansatzrohr), as Müller[1] terms the space between the cordæ vocales and the mouth and nares, exerts the chief influence in this respect. In the living subject the tension necessary for the production of sound is effected by muscular action, and the range of the motor nerves by which it is controlled is much more extensive than is generally admitted. Though the recurrent nerve plays the most important part in reference to the larynx, yet it does not monopolise the direction of the voice in the manner attributed to it by Galen. Experiments have proved that after division of both recurrent laryngeal nerves in animals, they are still, under the influence of pain, able to utter a cry; and Longet[2] has shown that it is the external branch of the laryngeus superior supplying the cricothyroid muscle which, in this case, is called into action; and, on the other, if this nerve is divided while the recurrent nerve remains entire, the voice becomes hoarse. Besides the nerve just mentioned, the motor nerves of the velum palati, the arches of the palate and the tongue deserve a consideration; they have hitherto been overlooked in paralytic affections of the voice; the little attention they have met with is due, in a great measure, to pathologists having attended to the action of the voice in connection with speech only, instead of viewing it also in relation to singing. Joseph Frank,[3] and especially the late Dr. Bennati,[4] have the merit of being the first to direct attention to the latter point. Dr. Bennati, himself a distinguished singer, had numerous opportunities of making experiments on the subject from being professionally connected with the opera in Paris.

---

[1] Elements of Physiology, transl. by Dr. Baly, vol. ii, p. 988.

[2] Recherches Expérimentales sur les Fonctions des Nerfs des Muscles du Larynx et sur l'Influence du Nerf accessoire de Willis dans la Phonation; Paris, 1841, p. 8.

[3] Praxeos Medic. Univers. Præcepta, vol. ii, p. 43; Lipsiæ, 1823.

[4] Etudes Physiologiques et Pathologiques sur les Organes de la Voix Humaine; Paris, 1833.

The loss of the voice is either partial or complete. In the former case, the patient is unable to sound his voice to its usual full compass; of this he will be best able to speak himself, if conversant with music; the high falsetto notes are generally affected. But not unfrequently the tone of the other notes is less clear and pure than in health, and the voice is unable to hold a note. On examining the fauces, the inner mucous membrane is found pale and relaxed; the movements of the velum and the uvula are indolent and imperfect. The upward and downward movements of the larynx are also impeded, as Joseph Frank noticed. In complete aphonia, there is an utter inability to sound articulate or inarticulate notes, and the individual can utter nothing above a whisper.

The causes are either peripheral or central. Among the former, we may enumerate injuries and operations about the neck implicating the recurrent nerve, tumours which compress it, especially aneurisms of the aorta, or the subclavian artery, tumefied bronchial glands, if they involve the nerves of one side only, hyperstimulation of the vocal nerves by undue exertion, singing, screaming, and continued loud speaking, rheumatic influences, such as a cold draught impinging upon the exposed or heated neck. Centric affections are more frequently seated in the upper part of the spinal cord than in the brain; they are lesions, diseases of the vertebræ, chronic myelitis, poisoning by narcotics (hyoscyamus, belladonna, stramonium,) and lead poisoning;[1] in the last case the aphonia is rarely isolated, but generally associated with other paralytic diseases, especially of the movements of articulation. Among the cerebral causes we have to mention violent affections of the mind, especially pain and epilepsy. The most frequent cause of aphonia, however, is reflex immobility. The uterine system exerts a marked influence, as the change in the character of the voice during the catamenial period sufficiently demonstrates. Amenorrhœa and hysteria are the conditions which favour it more particularly; for this reason the greatest number of patients suffering from aphonia are found to be females. The relation of the gastro-intestinal tract to the affection is shown in helminthiasis and cholera. In Asiatic cholera the voice is occasionally altogether lost, and is associated with anæsthesia of the trachea.

---

[1] Tanquerel des Planches; loc. cit., vol. ii, p. 62.

The affection generally runs a chronic course; it may last a year and more. When the aphonia is of the reflex character, the voice occasionally returns under the influence of powerful excitement, and again disappears, a fact that I have also frequently observed in Asiatic cholera. In treating the complaint errors are frequently committed owing to an assumption of an inflammatory element, and more particularly in the repeated employment of local abstraction of blood and the prohibition not to speak. The absence of cough, and of a coarse harsh respiratory murmur on auscultating the larynx, may serve as diagnostic criteria. The first thing we have to do is to fulfil the etiological indications. If this proceeding is ineffectual, or if we are unable to ascertain a cause, we must act upon the vagus; firstly, in the vicinity of its centric origin, by cupping in the neck, blisters with the endermic application of strychnine, the cold douche, and moxæ; the latter are also useful in determining whether the aphonia has been simulated, which it sometimes is for various purposes. Secondly, in its peripheral distribution; it is here that electricity and magnetism, and most recently electro-magnetism, have proved of greatest value. Thirdly, by means of reflex action through the stimulation of sensory nerves. Everybody recommends cutaneous counter-irritation; I have obtained most benefit by friction with croton oil; others praise the internal and external application of cajaput oil. Fourthly, by translation to the gastric tract of the vagus. Emetics have obtained a reputation in aphonia from an early period. Nauseating remedies are also useful in these cases; Bennati recommends a gargle composed of a solution of alum and decoctum hordei (ʒij—ʒv to ℥viij—℥x) for the aphonia caused by over-exertion of the voice.

CHAPTER XLII.

PARALYSIS IN THE MUSCULAR RANGE OF THE SYMPATHETIC.

The correct way to appreciate these paralytic affections was long since indicated by De Haen, who based his researches upon the excellent anatomical investigations of Petit (1726) and Winslow. He says in his 'Ratio Medendi'[1] the intercostal nerve does not therefore take its origin "from the common source of the nerves, the medulla oblongata, (which we used to consider as its origin within the skull, the nerve being rather an ascending branch that enters the cranium, than one descending to the trunk;) but it arises in the neck, the chest, and the abdomen, from those wonderful bodies termed ganglia; bodies which arise from the nerves, commingle the nerves, and give rise to new nerves." De Haen, however, found no one to follow him. On the other hand, Bichat's and subsequently Reil's hypotheses about the sympathetic met with an enthusiastic reception at the commencement of the present century, and physicians of easy faith, and even Mesmer's pupils, availed themselves of it to a degree almost amounting to insanity. The sympathetic became the scapegoat of ignorance. Modern physiology again restored the nerve to its rights, and it is only in the most recent times that its independent character has been established both in its anatomical and physiological relations.[2] Its ganglia and the nerve fibres[3] arising within them from a portion of the ganglionic corpuscles, secure its independence; the ganglia are central organs from which both the immediate and the reflected stimulation of the motor nerves proceeds. Henle's observation, which has been confirmed by Kölliker's experiments upon animals, affords positive evidence; they find that separate portions of intestine, so long as they remain in connection with the mesentery, and therefore with many ganglia, execute extensive movements when irritated, whereas they only contract locally when the mesenteric connection has been severed. Toxicological observations equally demonstrate the independence of the sympathetic. Poisoning with tobacco and arsenic paralyses the cardiac nerves and arrests the circulation, while the respiratory movements continue. The East Indian poison, upas antiar, which contains strychnine, acts similarly. On the other hand, the West Indian arrow poison, called urali, wurali, or woorara, the operative principle of which Robert Schomburgk's[1] investigations in Guiana have shown to be obtained from the strychnos toxifera, paralyses the respiratory and voluntary movements, at the same time that the action of the heart continues, and may be kept up by artificial respiration. This subject has already been elucidated by Brodie's accurate experiments, from which it appears that the poisons do not operate uniformly in the different classes of animals; thus, in the dog the effect of arsenic is greater upon the heart than upon the brain, while the reverse takes place in the rabbit.

---

[1] Vol. iii, p. 104.

[2] See—Bidder und Volkmann, die Selbstständigkeit des Sympathischen Nervensystems, durch anatomische Untersuchungen nachgewiesen, Leipzig, 1842; Bidder, Erfahrungen über die functionelle Selbstständigkeit des Sympathischen Nervensystems, in—Müller's Archiv, 1844, p. 359; Kölliker, die Selbständigkeit und Abhängigkeit des Sympathischen Nervensystems durch Anatomische Beobachtungen bewiesen; Zürich, 1845.

[3] Kölliker; loc. cit., p. 28.

Now these ganglia are also a source of spasms and paralysis of the so-called involuntary muscles, both of a primary and of a reflex character. Observations upon human beings in disease show that the sensory fibres of the sympathetic may propagate their reflex influence both to adjoining and to distant ganglia. Thus paralytic immobility is confined to individual parts of the intestinal tube, and the often painful efforts made by the upper portion give the affection a spasmodic or neuralgic character. In intestinal gangrene, on the other hand, we find the paralysing influence extending up to the heart. The independence of the sympathetic becomes very manifest in these dangerous conditions, from the cerebro-spinal system remaining unaffected either in its sensory or motor sphere. Unfortunately we are as yet lamentably deficient in observations on living individuals, by which we may hope to throw light upon this obscure region of pathology. It is difficult to say whether morbid anatomy with the means now at its command will be able to afford the desired elucidation; as yet the reflex neuroses, for which the sympathetic and its ganglia offer the most productive soil, have not in any way been cleared up by the scalpel or the microscope, even as they occur in the brain and spinal cord.

---

[1] See Froriep's Neueste Notizen, vol. xxii, April 1842, No. 465, 466.

The independent character of the sympathetic does not, however, place it entirely beyond the reach of cerebro-spinal influences; divine Providence has guarded the animal economy against unlimited domination of any organ; and even our doctrines of the nervous system have received a new impulse since the despotic supremacy yielded to the brain by older authors has been overthrown. The mutual relation is demonstrated even in the anatomical structure of the parts, for nervous fibres may be shown to pass from the brain and spinal cord to the sympathetic, as well as from the ganglia of the latter to spinal nerves. Well known vital phenomena occurring in healthy and morbid states in man, testify to this mutual influence; we shall confine ourselves to drawing attention to a few, taken from the range of paralytic affections that have not met with due appreciation. I borrow from the records of surgery, to which neuro-pathology is indebted for a more effectual advancement, on account of the absence of prejudice on the part of the observers, the description of a condition which occasionally follows very serious injuries, and illustrates the paralysing influence transferred from cerebro-spinal to sympathetic nerves and ganglia. Travers[1] has termed it prostration without reaction. The following are the main features: the arterial pulse fails and disappears; the beat of the heart is weak and fluttering; the cheeks and lips are cold, pale, and of a livid hue; there is no pain; no anxiety or oppression; apathy; unembarrassed, though rather frigid consciousness; and, finally, sopor; difficult respiration; relaxation of the sphincters, and convulsions. The duration of the condition extends from eight, twelve and seventy-four hours to two or three days. Among injuries, the most frequent causes are extensive burns. Twenty years ago I was called to see the wife of a distiller of 40 years of age, who, in tapping the spirits one morning, had approached the light too near, and in her fright forgot to turn off the cock of the cask. The burning spirits poured on her and scorched almost the entire cutaneous surface. The immediate consequence was an icy coldness and pulselessness in both radial arteries. The abdomen became tympanitic; the alvine and renal evacuations were retained; consciousness was perfectly clear; an answer was given to every question, and the unfortunate woman was even able to dictate her last will and testament to a lawyer. Immediately before death, which ensued eight hours after the occurrence, coma and dyspnœa supervened.[1] Comminution of the bones and laceration of the soft parts are occasionally followed by the same consequences. Thus in the case of a boy, of 13 years, related by Travers, the charge of a musket entered the thigh, and the radial pulse was instantly arrested; the face was pale; the skin cold, and the pupils dilated, as they are after the application of belladonna. There was an inclination to somnolency, but when waked up he was perfectly conscious; he complained of no pain, had an insatiable thirst, and the sopor increasing he died nine hours after the injury. The trochanter and the thigh were comminuted, and the muscles and femoral artery lacerated. The hæmorrhage was trifling even during life; the ends of the artery were almost two inches apart, and had contracted. Nothing abnormal was found in the cranial, thoracic, or abdominal cavities. This condition has also been met with after operations, especially after lithotomy in children.[2]

---

[1] See this author's admirable work—An Inquiry concerning that disturbed state of the Vital Functions, usually denominated Constitutional Irritation, 2d ed.; London, 1827, p. 106.

I have already alluded to the anatomical fact that sympathetic nerve-fibres derived from ganglia pass to cerebro-spinal nerves, and accompany them in their course.[3] A direct influence upon nutrition has been attributed to them: in fact, the terms vegetative or organic nerve have been employed synonymously with the term sympathetic nerve. Modern researches, especially those of Henle and Valentin, have effected a thorough reform in these views; and what has hitherto been ascribed to the direct influence of the nerves upon secretion and metamorphosis, may with greater propriety be attributed to the influence exerted by the nerve-fibres upon the contractile elements of the vessels; our knowledge of the contractile elements, which are removed from the control of the imagination, and the motor power of which takes its origin in the sympathetic, has advanced generally. In this respect the skin demands an especial consideration, and it is indeed strange that the veterinary surgeon pays more attention to its turgor or tone in animals, than the physician does in diseases of human beings. In intestinal gangrene, in which there is an undoubted paralysis of the sympathetic, we find the skin presenting a similar condition as in Asiatic cholera. The skin feels doughy, like soft clay, and if pinched up on the abdomen, or in the neck, remains standing in a doughy, indolent fold, which only subsides by degrees.[1] The debilitating and paralysing influence which derangements in the functions of sympathetic nerves exert upon the cerebro-spinal tracts, by means of reflex action through the spinal cord, will be considered when we treat of spinal paralysis.

---

[1] Several Cases of this kind are given in Travers' Work, p. 63—80.

[2] Travers', p. 89.

[3] Volkmann; loc. cit., p. 84.

---

[1] See—Romberg; Einige praktische Bemerkungen über Asiatische Cholera, in Casper's Wochenshrift fur die gesammte Heilkunde, 1833, p. 770.

CHAPTER XLIII.

PARALYSIS IN THE RANGE OF THE CARDIAC NERVES.

THE doctrine of Le Gallois, that the heart's action is independent of the spinal cord, is at variance with the well-known phenomenon of the heart continuing to pulsate after it was cut out of the body, or after the destruction of the spinal cord, while *in situ*. Bidder[1] found, on opening the thorax in frogs, in whom the spinal cord had been destroyed several weeks previously, that the heart made as many, and apparently as vigorous contractions, as in others that had just been decapitated; in one case, twenty-six days after the removal of the spinal cord, the heart was found to beat forty times in a minute, while in another animal, which was not injured, the heart only made thirty-five beats in the same time. A similar relation was observed after the brain or both nervous centres had been simultaneously destroyed, though the phenomenon did not last so long. Remak's[2] discovery of small ganglia on the most minute ramifications of the nerves in the substance of the heart, still more weakened the above-mentioned assumption, and paved the way for the physiological interpretation of the independent character of these nerves. Experiments made upon living and recently killed animals appeared at first to render the conclusions doubtful, but Volkmann[3] has shown that even without any irritation of peripheral nerves of central organs, the heart of recently killed animals generally moves very irregularly, and even after having ceased to pulsate for a considerable period, again resumes the movements, without any external cause. The same distinguished inquirer[4] has observed, that while the entire heart of the frog performed its movements perfectly after being cut out, instant arrest of movement took place in individual parts after certain injuries, from which it follows that there are certain points in the heart from which the impulses proceed, and without which no movements can ever be induced. Kölliker[1] has discovered the point at which auricles and ventricles meet to be the centre of action, for if a heart be cut up into small pieces, those only continue to pulsate which are taken from this part, and no others. Some of the experiments made by Dr. Marshall Hall[2] are of importance in a pathological point of view. After the brain and spinal cord of an eel had been destroyed, the heart continued to beat vigorously, sixty times in a minute. A stroke of the hammer applied to the stomach instantly arrested the movement of the heart, and it continued at rest for several seconds. A contraction then followed; after a long interval, a second took place, and by degrees the full action was restored. In the same manner paralysis of the nerves of the heart and sudden death occurs in many other violent injuries to the abdomen, blows upon the stomach, &c. This effect takes place more slowly in gangrene of the intestines; the contractions of the heart become weaker and weaker, irregular, and intermittent; they are unable to propel the blood far, for which reason there is no pulse in remote arteries, such as the radial and the popliteal, and the surface is cold and presents a blueish-grey hue. The unimpaired state of the intellect, and the continuance of the cerebro-spinal functions of sensation and motion, form a striking contrast with these phenomena.

---

[1] Müller's Archiv, 1844, p. 371.

[2] Casper's Wochenschrift für die gesammte Heilkunde, 1839, p. 149.

[3] Müller's Archiv, &c., 1842, p. 373.

[4] Ibid., p. 424.

A temporary arrest of conduction in the motor nerves of the heart, is manifested by immobility of the heart, and by intermissions of its impulse and its sounds. A very instructive observation, which is the more interesting on account of the diagnosis which had been made, has been communicated by Dr. Heine.[3] The patient, a man of 36 years of age, who applied for advice in the Viennese Hospital, complained of a very peculiar affection, which was at first looked upon as one of the numerous symptoms of hypochondriasis; he stated that his heart often stood still. At the very next visit he was, however, able to demonstrate the fact, for there was an intermission of five or six beats of the heart and the pulse. The aspect of the patient showed, that at the time something terrible was going on within him; he sat there as if thunderstruck (attonitus), speechless, motionless, his eyes wide open, his consciousness unimpaired. When asked about his sensations, he stated positively, that for a second, or often more, he had a presentiment of the coming arrest, in the shape of internal restlessness and oppression; that when the stoppage took place, a violent pain seized both sides of the thorax, extending to the neck and then passing up to the nape and the head; that the pain remained fixed in the latter for some time after the attack, and that when the fits were frequent, he could scarcely get rid of a sense of weight at the cervix. He knew of nothing except mental emotions, which had a tendency to produce the attack; that, without any known cause, the malady had irregular periods, during which it occurred much more frequently than at others, as often as ten or twelve times during the day, and that it then would intermit for several weeks; during the six months preceding his application for advice, the fits had become much more frequent. The attack passed off with a sigh, and the action of the heart was restored without any perceptible change in the patient, except that the first beats were rather accelerated. The most accurate examination of the heart during the free intervals, failed to demonstrate any abnormity in the rhythm, the sounds, and the extent of the cardiac dulness. He coughed, and had a slight expectoration, and also complained of frequent vertigo, but he always avoided inquiries about these matters as trifles, in order to return to the subject of the heart affection. Towards evening he had slight febricitations, but never suffered from dyspnœa; he was able to lie on either side, to mount stairs without difficulty, and during the paroxysm his face did not become red with congestion, or present the lividity of suffocation, but was overspread with pallor. The attacks gradually increased in frequency, they endured longer, and the headache and pain at the cervix became persistent; he lost strength daily, was unable to leave the bed on account of vertigo, and died in a state of sopor, which had lasted some days.

---

[1] Die Selbstständigkeit und Abhängigkeit des sympathischen Nervensystems, p. 36.

[2] On the Diseases and Derangements of the Nervous System, p. 128.

[3] Müller's Archiv, 1841, pp. 234—247.

[illegible] had repeatedly examined the patient with Professors [illegible] and [illegible] on account of the integrity of [illegible] the movements of the heart, the spinal cord and [illegible] and from the absence of every pain- [illegible] was diagnosed to depend upon a [illegible] the upper cervical plexuses, or [illegible] of the cervical portion of [illegible] performed the autopsy. The [illegible] which ascends from the plexus lying between the descending aorta and the pulmonary artery was [illegible] a [illegible] of the size of a hazel-nut, by the [illegible] forming the cardiac nervous plexus, before its entrance into the [illegible] nerve was thickened. The branches of the left vagus which descend upon the anterior side of the left bronchus to the pulmonary plexus, proved to be wrapped in the same way by an underlying nodulated, [illegible] lymphatic gland. In the pericardium were two drachms of serum; the heart was of the usual size and tough; in the [illegible] and in the large vessels there was fluid blood. [illegible] as well as the lymphatic glands lying along the [illegible] arteries and behind the large vascular trunks, were [illegible] hard masses, containing [illegible]. One of these, the size of a bean, inter- [illegible] nerve at about the middle of its course, near the root of the lung. With the exception of a small portion of its [illegible] that passed over the surface of the mass, the nerve was entirely absorbed [illegible]; above it was thick, and below its size was reduced by two thirds. The solar ganglion was very large, and enveloped by a pale vascular cellular tissue. Greyish serum was accumulated between the spinal meninges. The spinal arachnoid, more particularly at the upper lumbar and dorsal region, was beset with osseous lamellæ of the size of a millet seed or a lentil; the pia mater was congested, its vessels dilated, the spinal marrow large and thick, and the cervical portion particularly voluminous; its substance was soft throughout, the grey tissue very pale, and the medullary portion of a pure white. The convolutions of the brain were flattened; the grey matter was thin, the medullary substance pulpy, and the lateral ventricles extremely distended, with about four ounces of clear serum. The left hemisphere of the cerebellum was enlarged at its posterior edge, and close to the surface were numerous tubercles imbedded in the substance, and varying in size from that of a hempseed to that of a pea, of yellow colour and lardaceous consistency. The medullary portion of this hemisphere, with the exception of the crus cerebelli ad corpus quadrigeminum, was of a pale yellow colour and softened. The inferior vermiform process, as well as the medulla oblongata, were pushed over to the right side, the eminences at the base of the cranium were more marked, and the left occipital fossa rather larger than its fellow. The anterior portion of the pituitary body was flattened, the posterior lobe enlarged, rounded, and its substance of a dark rusty colour and pulpy; the cellular tissue connecting the two was infiltrated with a gelatinous mass. The petrous bones were rough and cribriform at their anterior surface, and especially under the external portion of the ganglion Casseri; similar spots were also found on the alæ magnæ of the sphenoid bone. Both lungs were bloated, the cells coarse, and full of blood, they were partly œdematous, and their apices, especially the one on the left side, extensively condensed into a blackish blue, hard nodulated mass interspersed with a greasy, cretaceous substance; a similar spot of the size of a hen's egg, was also found at the anterior and lower portion of the right upper lobe.

Instances of the influence exerted by other organs that are provided with sympathetic fibres, upon the temporary interruption to the conduction of the motor nerves of the heart, often enough occur to the physician, and especially in affections of the intestinal canal. Bilious accumulations, helminthiasis and critical diarrhœa are accompanied by intermissions of the pulse and of the beat of the heart; they precede the occurrence of intestinal hemorrhage.

A paralysing influence is not unfrequently exerted upon the cardiac nerves by the cerebro-spinal system. The movements of the heart are sometimes arrested by violent injury of the extremities.[1] It occurs more frequently as a result of violent emotions and injuries of the head, accompanied by concussion of the brain, in which case, if death does not ensue instantaneously, the reaction may after a time set in, owing to the action of the heart being again excited. Syncope is a similar condition, for the consideration of which I refer to the fourth division of the present work. I am not acquainted with cases in which injuries or diseases of the spinal cord produced a paralysing effect upon the heart.

---

[1] Marshall Hall; loc. cit.

The part which the blood takes in the motor action of the heart, even if only effected by the intervention of the nerves, is not manifested in reference to spasm alone, but also with regard to paralysis. Of this we have a proof in asphyctic cholera, the symptoms of which in this respect much resemble those of intestinal gangrene. The specific influence of certain medicinal agents in retarding and temporarily arresting the action of the heart, digitalis, tobacco, or arsenic (in frogs, according to Budge,[1] corrosive sublimate), may be explained by the combined action of the blood and the nervous energy. The experiments instituted by Henry, Müller, and Valentin,[2] show that when a frog's heart is cut open, while it is still pulsating, and the internal surface painted with a solution of tincture of opium, the contraction of the ventricle ceases at once, and cannot be restored by inducing a strong galvanic current.

---

[1] Allgemeine Pathologie, p. 139.

[2] Valentin; Lehrbuch der Physiologie des Menschen, vol. ii, p. 60.

CHAPTER XLIV.

PARALYSIS OF THE NERVES OF THE ALIMENTARY CANAL.

We are better acquainted with the paralytic affections of the entrance and the exit of the contractile alimentary tube, which are under the control of the cerebro-spinal system, than with paralysis of the intervening apparatus, the movements of which mainly depend upon the sympathetic.

PARALYSIS OF THE PHARYNX AND THE ŒSOPHAGUS.

Dysphagia Paralytica.

The difficulty or impossibility of deglutition occurs suddenly or by degrees. The transit of solid and liquid substances is impeded. There is no regurgitation; the patient is obliged to extract the morsel, which becomes impacted in the throat, with his fingers, and this is a matter of some difficulty, because it is softened with mucus, which not being consumed in insalivation, accumulates in considerable quantity and runs out of the mouth. When the patient drinks, suffocative attacks supervene, unless the entrance of the liquid into the glottis is prevented by bending the head backwards. If the probang is introduced no impediment is met with. Sensation is generally intact; the patient feels the difficulty of swallowing, and the point at which the morsel is arrested. Sometimes sensibility is even exalted, and there is a sensation of a compressing, constringing body at the upper part of the neck. In the course of time emaciation ensues, but not to such an extent as in carcinoma of the œsophagus.

The cause of œsophageal paralysis rarely resides in the peripheral distribution of the vagus and accessorius; a few instances have already been quoted. The seat is generally central, occupying either the cervical portion of the spinal cord or the cerebrum. Other paralytic symptoms are associated with it. When the vertebræ are affected, or if there is [illegible] There is also sometimes a unilateral paralysis of the œsophagus: I have had two patients under my care, who, after an apoplectic attack, were paralysed on the left side, and unable to swallow the morsel if it got to the left side of the pharynx. In three cases Bright[2] found the corpora striata to be the seat of the disease. Paralysis of the œsophagus has been occasionally observed associated with dumbness or aphonia as a result of violent mental emotion.[3]

In our treatment we have first to attend to the preservation of life by the introduction of an elastic œsophageal tube. The fundamental disease, whether in the spinal cord, the brain, or their membranes, must be attacked by counter-irritants, issues, setons, and the repeated application of cupping-glasses to the cervical region. When there is no inflammatory derangement of the central organs, we must employ strychnia endermically. The cases on record in which electricity was had recourse to, lead us to form a high opinion of its efficacy. Monro, among

---

[1] Traité des Maladies de la Moëlle Epinière, 3d ed., vol. ii, p. 319.

[2] Reports of Medical Cases, vol. ii, p. 330.

[3] Joseph Frank; Prax. Medic. Univers. Præcepta, vol. i, p. 126.

several successful cases, relates one of a patient who was only able to swallow when sitting upon the electric stool. We should try direct irritation of the pharynx and the œsophagus, in order to excite the contraction of the muscular fibres by reflex action. The older physicians recommended ethereal oils for this purpose, and advised their patients to chew acrid substances; the case given at page 13, of this Volume, shows the utility of introducing a silver ball attached to a wire, and offers an encouragement to repeat the proceeding in similar cases.

INTESTINAL PARALYSIS.

In addition to the features above delineated of the arrested action of sympathetic centres, we find in this case a cessation of the peristaltic movement; and the intestine, possessing no power of resistance, becomes distended with liquid and gaseous fluids (meteorismus, tympanites.) Intestinal paralysis occurs secondarily to other diseases, first of the intestinal canal itself; as in enteritis, in the most marked form in gangrene of the intestines, in peritonitis intestinalis, and dysentery; in blood diseases, typhus, phlebitis and inflammatory or septic puerperal states. Tympanitis puerperalis sometimes threatens danger even without such antecedents. Diseases of the brain and spinal cord are not followed by paralysis of the intestines. The constipation and distension of the abdomen often accompanying injuries, especially of the spinal cord, depends upon paralysis of the abdominal muscles, and the consequent arrest of their compressing power.

The occurrence of partial paralysis of the intestine may be assumed with some probability; the pathological fact of dilatation of individual portions, with softening and relaxation of the contractile parietes, without any constriction or disorganisation below the dilated part, favours the view. Thus we find the stomach so much distended as to fill the abdomen. In the same way local enlargements occur in the colon or in the small intestine amounting to the thickness of the arm; in this case during life there are obstinate constipation and symptoms of ileus, a subject on which Abercrombie[1] has instituted instructive investigations. The curative effect of electro-galvanism also affords a proof of the paralytic immobility of sections of the intestine in cases of this description, in which spasm and inflammation only occur as secondary results.

---

[1] Pathological and Practical Researches on Diseases of the Stomach, the Intestinal Canal, the Liver, and other Viscera of the Abdomen, pp. 132—141.

PARALYSIS OF THE ANAL MUSCLES.

The transversely striated muscles of the anus are in a state of antagonism to the organic muscular fibres of the rectum; the sphincter, the levator ani and the transverse perineal muscles, receive their motor impulse from the spinal cord, and lose their power of contraction as soon as the conducting power, whether motor or reflex, of this organ is diminished or destroyed. Very soft liquid excrements and flatus, for the discharge of which the contractions of the rectum suffice, in this case escape involuntarily; while more solid fecal matters, which can only be evacuated with the assistance of the expiratory movements, are retained, as under these circumstances the abdominal muscles are also generally deprived of their action to a greater or less degree.

CHAPTER XLV.

PARALYSIS IN THE RANGE OF THE NERVES THAT CONTROL MICTURITION.

The antagonism existing between the muscular coat of the bladder and the sphincters may continue or be arrested when both systems are seized with paralysis, in the same way as we have found it to be the case in spasmodic affections of these parts.

PARALYSIS OF THE DETRUSOR URINÆ OF THE BLADDER.

Ischuria Paralytica.

This affection is characterised by retention of urine, by the bladder filling visibly and so as to be perceptible to the touch, without any sensation on the part of the patient or desire to micturate. The inability to pass the water is only complete, when there is also paralysis of the abdominal muscles; as long as they can be made to act, the accumulated urine will be forced out in a slow current and in small quantities. After the urine has been removed by the catheter, the bladder continues distended and is incapable of contracting.

PARALYSIS OF THE SPHINCTER.

Eneuresis Paralytica.

The bladder ceases to be a reservoir for the urine, which passes off through the urethra in small quantities, as soon as it is discharged from the ureters; it is often voided drop by drop, following the law of gravitation, and without forming an arched or spiral current. On examining the hypogastrium the bladder is found empty and contracted. There is generally no desire to micturate; if present at the commencement of the disease, it coincides with the involuntary discharge; whereas in health a short interval intervenes between the sense of irritation and the contraction of the bladder and a long [illegible] in [illegible] cases precedes the onset of paralytic enuresis.

PARALYSIS OF THE [illegible] AND SPHINCTER [illegible]

As we find spasmodic ischuria and enuresis combined (see vol. II, page 24), we also meet with a complication of paralytic retention and incontinence; if not recognized, an erroneous treatment will be adopted. As the urine trickles away, that which is retained is not thought of, although the swollen bladder may be so full as to present a fluctuation through the abdominal parietes, especially in thin individuals, as well as through the rectum and the vagina, and although external pressure may suffice to expel a large quantity of urine. The best proof of the extent to which the bladder may become distended is afforded by the fact that it has been occasionally mistaken for ascites. Peter Frank[1] relates an instance of this kind, in which the bladder contained eighty pounds of urine, and had raised up the diaphragm. Brodie[2] describes the post-mortem appearances of a paralysed bladder, from which at one time forty ounces of urine had been discharged by the aid of the catheter. Its size was very considerable; the muscular fibres were atrophied to the last degree. The inner membrane was excessively thin and could be easily detached; the bladder presented an almost black colour throughout, but there were no other symptoms of gangrene.

The causes that produce paralysis of the vesical nerves occupy a peripheral or centric seat. Among the former we have to enumerate excessive distension and expansion of the muscular and nervous fibres of the bladder, by which their irritability is diminished or extinguished. It is sometimes induced by the voluntary retention of the urine commanded by peculiar circumstances,[3] or by repletion of the bladder resulting from mechanical or spasmodic obstacles. Compression by adjoining organs or morbid growths may cause paralysis; thus in females the uterus, whether distended by pregnancy or fibrous humours, may have this effect. Influences implicating the sacrum, and the lower sacral nerves must be here considered; a blow, or fall received upon the posteriors, strong concussiou by continued riding, occasionally gives rise to an isolated paralysis of the bladder without affecting the abdominal muscles. Causes acting from one of the nervous centres are more frequent than the former, and especially injuries and diseases of the spinal cord which but rarely induce an exclusive paralysis of the sphincter, but are accompanied by ischuria, which is the more complete, if at the same time there is paralysis of the abdominal muscles and anæsthesia. We must not overlook the important part played by the latter, and as in the causation of spasm of the bladder reflex irritation is a moment of importance, on the other hand the absence of sensation, or more correctly of the centripetal nervous influence, is the cause of the immobility of the bladder, the motor nerves of which may under these circumstances continue susceptible of the stimulus of the will. The reverse is the case when apoplectic, soporous or typhous affections of the brain prevent the individual from becoming conscious of the sensation of the urinary stimulus. In this case there is an absence of the stimulus and control of the will, while reflex stimuli (sprinkling the abdomen with cold water, the application of cold to the soles of the feet, cold water enemata, titillation of the neck of the bladder) excite the action of the motor nerves, which continue possessed of the power of conduction. Desault[1] had a patient under his care of 87 years of age, who was affected with vesical paralysis, upon which calculus supervened. The urine could only be evacuated by the aid of a catheter, but as soon as vesical hemorrhage occurred, not only the blood but also the retained urine passed off readily. A predisposition to vesical paralysis exists in old age, and especially in the male sex and after excess in venery. After

---

[1] De curandis Hominum Morbis Epitome, vol. vi, p. 506.

[2] Lectures on the Diseases of the Urinary Organs, 3d ed.; London, 1842, p. 100.

[3] Ambrose Paré (Œuvres complètes ed. Malgaigne, Paris, 1840, vol. ii, p. 498), relates the following in his quaint manner: "A young serving man was returning from the country with a respectable young lady, his mistress, riding behind him, and with suitable accompaniment, and while on horseback, he was seized with a desire to micturate, he did not venture to dismount, and still less to make water in the

saddle. Having reached this town, and wanting to discharge his urine, he could in no way do so, and was seized with great pains; he was covered with perspiration, and almost fainted away. I was then sent for, and the people said it was a stone which prevented him from making water. When I arrived, I put a sound into his bladder and pressed the belly; and by this means he discharged about a pint of water, and I found no stone, nor has he experienced any inconvenience since."

[1] Œuvres Chirurgicales, 3d ed.; Paris, 1830, vol. iii, p. 135.

epileptic attacks, ischuria sometimes occurs which lasts several days. Among the morbid processes rheumatism and arthritis are the most favorable to its production. Paralysis of the bladder occasionally results from the abuse of diuretics. In paralytic retention the danger may be increased by the supervention of disorganization of the bladder, by reaction upon the kidneys and by alteration of the blood. When there is anæsthesia of the bladder, the reaction upon the brain ensues later than when the sensibility is maintained, and as a rule, paralytic ischuria never proves so speedily fatal as the spasmodic form. The incontinency runs a slower course, and generally terminates by the supervention of paralysis of the muscular fibres of the bladder.

The local treatment is of extreme importance in vesical paralysis. In ischuria the catheter operates not only by emptying the bladder, but also as a reflex stimulus, especially if it comes into contact with the parts adjoining the orifices of the ureters. If there is a difficulty in introducing the catheter repeatedly, it should be allowed to remain in the bladder. In enuresis a thin sound or bougie should be introduced into the urethra; it acts as a stimulus upon the middle and posterior portions and induces contraction of the sphincters. Other reflex stimuli are also employed for therapeutic purposes, such as the application of cold to the cutaneous coverings of the abdomen and the soles of the feet, or to the rectal or vaginal mucous membrane; the rectum may be stimulated by enemata or suppositories. By fulfilling the etiological indications we may sometimes, though rarely, obtain a successful result; thus in diseases of the vertebræ and of the spinal cord, the application of issues or moxæ may prove effectual, or if we have to deal with a rheumatic subject, camphor may achieve our object. A specifically exciting influence is exerted upon the motor vesical nerves by cantharides, both administered internally in doses gradually increased from 5 to 15 drops, and particularly in the shape of a blister applied to the sacrum and dressed with unguentum cantharidum. Lotions, containing tincture of cantharides and the mixtura oleobalsamica applied to the region of the bladder, the back, or the internal surface of the thighs, are less effectual. The nux vomica and strychnine, the latter applied endermically in doses of ¼ — ⅓ grain, sulphates of strychnine and the ethereal oil of turpentine, are also to be recommended. Electricity has long been in favour, and modern experience bears testimony to the value of the douche applied to the sacral and vesical regions. In the paralytic affections of advanced age the invigorating warm mineral baths of Gastein and Wildbad deserve a trial.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] sometimes offer an equally precise proof of the same, as for instance the following case which was [illegible] by [illegible] and has been communicated by Longet.[1] A member of the National Guard in Paris was wounded with a knife in the back of the neck, and instantly fell on his right side. On the day after the accident, he was admitted into the hospital, at which time he complained of no pain, but only of a slight sense of numbness of the right side. The wound at the side of the neck, which was horizontal, and had been plastered up, was found to be 13 millimetres (about half an inch) in length and on a level with the fifth cervical vertebra at a distance of 24 millimetres (about an inch) from the spinal process. The movements of the head and neck were painless and unimpaired. The wounded man felt a weight on the right m and formication in the hand; he was able, though with ome trouble, to raise his arm and to move the forearm, but he as unable to extend or to close the semiflexed fingers. The ght inferior extremity was deprived of the power of movement. vague pain extended over the right side of the thorax; hroughout, in the arm, the trunk, and the leg, sensation was ompletely unimpaired. The other functions continued in perfect order. On the third day after the injury the patient's condition changed manifestly for the worse; the pulse became irregular, the breathing was accelerated, hiccup supervened, the dyspnœa increased, and on the sixth day death ensued. At the autopsy a piece of a broken blade was found in the right side of the arch of the sixth vertebra, the point of which projected between the bodies of the sixth and seventh vertebræ and had passed by the posterior wall of the pharynx. The anterior column of the cord was divided to this extent, from the posterior lateral furrow to the anterior median fissure. The corresponding posterior column was untouched. We have already alluded to similar surgical cases without the post-mortem results.

---

[1] Anat. et Physiologie du Système Nerveux, vol. i, p. 331.

We also possess cases of disease limited to the anterior columns, with exclusive loss of the motor conducting power. Hutin records the case of a paraplectic subject, whose legs retained their sensibility intact. The lower ten dorsal vertebræ were found to be carious, and the body of the tenth projected inwards towards the canal so as almost to bend the cord at right angles and to cause it to be reduced to nearly half its size; the atrophy affected exclusively the anterior surface, so that the grey matter instead of being in the middle, [illegible] A female was under the care of Cruveilhier, [illegible] paralysis of both legs, with contraction [illegible] tion con[illegible]ing unimpaired. From time [illegible] red in these limbs. Mictu- [illegible] he patient's control. On [illegible] etaching the dura mater, [illegible] ith a sharp margin, in the [illegible] ra, terminating below in a [illegible] ce of the spinal cord and [illegible] The pressure thus exerted

---

[illegible], vol. i, p. 29.

upon the cord was considerable. On section the spinal cord looked as if constricted. It is very rare to find disorganising processes such as inflammation or softening limited to the anterior columns; for though during life we may have undoubted evidence of a limitation of this kind, the cadaveric influences generally suffice to remove it; we allude to the position on the back, the influence of the spinal fluid, the warm temperature and the manipulation during the examination, which is generally not made till 24 or 48 hours after death This suffices to explain how it is that although in some cases the paralysis is confined to the upper extremities, the softening of the cervical portion of the spinal cord is not found limited to individual segments, but affecting the entire thickness o the cord.[1]

Spinal paralysis generally makes its appearance in the shape of paraplegia, affecting both halves of the trunk at the same time, or in succession. The muscles of the lower extremities and of the pelvis are chiefly paralysed; in the majority o instances exclusively so; or the paralysis commences in these parts and ascends or, though rarely, descends. When a favorable issue takes place the upper extremities are the first to recover their normal state, in contradistinction to what occurs in cerebral paralysis. When the paralysis is incomplete, and when there is merely a diminution and not an abolition of the motor power, movement following an impulse of the will is weaker and more indolent than in health, and is facilitated by supporting the trunk, and particularly by placing it in a horizontal position, a circumstance not observed in paralysis proceeding from cerebral lesion. The muscles, and especially the flexors, are relaxed, though in rare cases they are found contracted. They are sometimes seized with convulsive movements.

A diminution or loss of cerebral, conscious sensation, generally coexists with the paralysis. In the first case, the perception of cutaneous and muscular impressions is not alone obtuse but also retarded; it is a point of physiological interest, as we rarely meet with opportunities of measuring the velocity of conduction, to observe that the conduction of sensation is effected very slowly; it requires, as Cruveilhier[2] has already remarked, from 15 to 20 seconds for its transmission. In some patients it is necessary to repeat the impression several times before they become conscious of it. Even if there be complete anæsthesia, the sense of pain, heat, cold, or formication may manifest itself in obedience to the law of excentric phenomena. When motility and cerebral sensibility are entirely lost, spinal or unconscious sensibility manifests itself in the paralysis dependent upon the spinal cord as a conducting apparatus, by reflex action. The sole of the foot is the part most suited to experiments of this description, we succeed best by tickling, or the application of heat. The reflex movement generally takes place in the foot of the same side, though it may occur in both, in which case the movement is less marked in the irritated extremity; it rarely takes place in the upper extremities if they are also paralysed. Strychnine exalts the spinal sensibility and the reflex action; it is diminished by too frequent a repetition of the experiments, though it is restored by a little rest. In spinal injuries some time elapses before these phenomena are manifested, a circumstance probably dependent upon the concussion of the organ. In the case of recovery, sensibility returns sooner than motility.

---

[1] Anatomie Pathologique, livr. xxxii.

[2] Loc. cit., livr. xxxviii, p. 9.

In spinal paralysis there is always some disturbance in the nutritive functions. One of the most uniform symptoms is a tendency to decubitus and gangrene of the parts pressed upon, which occurs the more rapidly, and the more extensively, the sooner the conduction of the spinal cord is interrupted, as in fractures of the vertebræ. Anæsthesia appears to form an essential element in this process, while the loss of resisting power induced by it, causes the parts most exposed to pressure, the sacrum and trochanters, to be sooner attacked than others. Occasionally gangrenous bladders form at the ankles and on the dorsum of the foot, although this is more rarely the case in the affection before us than when the arteries have become impervious. We have next to allude to the constitution of the urine. It is almost invariably alkaline in spinal paralysis, either from its commencement or in its further course. In the former case it is very probable that the renal secretion has been thus changed by nervous influence. Smith[1] emptied the bladder of a patient labouring under traumatic injury of the spinal cord with Read's syringe, then repeatedly injected tepid water, until no trace of alkalescence was perceived; he then again injected a small quantity, which was left in the bladder for from 20 to 30 minutes. When emptied it exhibited an ammoniacal reaction, showing that the urine reached the bladder in this state. On the other hand, when retention of urine occurs in paraplegia, the influence of the stagnating urine upon the mucous membrane of the bladder, the ureters and pelves of the kidneys shows itself as in other cases of ischuria, by exciting inflammation and causing the secretion of a viscid and sometimes sanguineous mucus, and a deposit of phosphates. Dupuytren was among the first to notice that in paraplectic individuals the catheter rapidly becomes coated with incrustations, and Ollivier publishes a case in which, on the eighth day after fracture of the vertebræ, these incrustations were perceived, and on the twenty-second, calculi were voided. On section a false membrane was found on the inner surface of the bladder, which was studded with minute calculi. We possess too few observations to determine the question regarding the quantitative relation of the urinary secretion in spinal paralysis. Sir Benjamin Brodie[1] found that the amount was reduced, especially in injuries of the cervical portion; in one patient it was reduced to four ounces in twenty-four hours. The temperature and perspiration are lessened. The skin becomes dry, squamous, and branny. Dropsical infiltrations are of rare occurrence. Atrophy of the paralysed parts often supervenes.

---

[1] London Medical Gazette, 1832, vol. ix, p. 661,

These general features are modified by the seat of the injury or disease, and by the peculiarities of the latter. Dysphagia and dyspnœa accompany cervical affections, and the upper extremities are affected in a greater or less degree by anæsthesia and paralysis. The extent of the respiratory paralysis suffices to determine the limits of the injury. When the dorsal region is affected, the arrest in the activity of the respiratory muscles, and especially of the muscles of expiration, is characteristic; in this case paralysis of the more or less relaxed and flabby abdominal muscles, destroys their compressing power and thus promotes the development and accumulation of the intestinal gases to such an extent as to produce considerable meteorism. In two cases of spinal paralysis that have occurred to me, I have seen the abdominal parietes so pendulous as to resemble a flaccid bladder.

---

[1] Observations relative to Injuries of the Spinal Cord, in Medico-Chir. Trans., vol. xx, p. 142.

When the lumbar portion is injured, the paralytic affection resides in the lower extremities and the muscular fibres of the pelvic organs, and it shows itself in the male sexual organs by an absence of erections even when there is persistent retention of the urine. It is the more singular to find priapism more frequently accompanying injuries of the cervical than of the dorsal region. In reference to the seat of injury compared with the region paralysed, it will be well to remember a point to which Ollivier has drawn attention, that the spinal nerves traverse a longer distance from their insertion to the intervertebral foramina, the lower their position in the spinal cord. The spinal column may therefore be injured in the vicinity of the foramina intervertebralia of the lumbar region, and yet the conducting power of several nerves which are destined for the lower extremities be preserved.

The modification of the symptoms dependent upon the peculiar nature of the disease, will be detailed in the section treating of the diseases of the formative sphere of the nervous system. A few general remarks may not, however, be out of place here. Diseases of the bones especially affect the motor functions, and yet frequently spare the sphincters. The fact of sensation being less extensively and frequently involved, is probably owing to the disease residing in that part of the vertebræ which adjoins the anterior columns of the cord. The local symptoms are of greater diagnostic value in paralysis depending upon affections of the bones, than in other spinal paralyses; we find changes in their shape, increased sensibility and tenderness to the touch, and to the application of heat. In these cases the treatment is followed by more beneficial results, both temporary and permanent, than in other forms of paralysis. Narrowing of the foramen magnum occipitale, by thickening of the bone and the dura mater as a source of compression, deserves more attention than it has hitherto met with in post-mortem investigations.[1] Morbid states of the

---

[1] See—Bright's Report of Medical Cases, vol. ii, p. 377.

[illegible]

[illegible]

[illegible] paralysis occurs early in life and during the first years, the influence exerted upon nutrition and the form of the soft parts and the bones will be all the greater: the paralysed limb becomes more or less atrophied and distorted, as shown in the following case:

[1] An unmarried female, aged [illegible], was a patient in the Salpêtrière, for carcinoma uteri; her left leg was completely atrophied, flaccid and paralysed, from seven to eight inches shorter than the right leg, useless in walking and deprived of sensation. Notwithstanding the use of crutches, she had a difficulty in moving the right leg, which instead of presenting the greater development found in individuals who only have one leg at their disposal, presented a diminution of circumference and of muscular vigour, and also an incipient varus. The upper extremities were normal. At the post-mortem, all

---

[1] Cruveilhier, Anat. Patholog., livr. xxxviii, p. 4.

the muscles of the left leg were found converted into fat, yet provided with sheaths, and recognisable by their fasciculated arrangement. A few muscular fasciculi were yet visible in some of the muscles; in the gluteus four, in the plantaris two were found. In the right leg the muscles of the posterior surface of the thigh, the semitendinosus, semimembranosus, and biceps, were converted into fat. The spinal column presented an angular curvature in the dorsal and lumbar region, with the concavity directed to the left side. The lower portion of the spinal cord was much atrophied, to the extent of about 3½ inches, denser than usual, and of a grey colour. The median fissures appeared effaced at this part, and the tissue was converted into a grey, homogeneous indurated mass. The grey degeneration was much more considerable on the left than on the right side. The perceptible difference was traceable in the nerves going off from this spot. In the vicinity of the second and third dorsal vertebræ, the posterior columns of the cord in the vicinity of the mesian fissure participated in the grey degeneration, and were fused together at the lower portion of the spinal cord. Four or five grey islets were found in the pons Varolii. The left pyramid was somewhat atrophied, and small spots of a grey colour showed above and below the left olivary body. At the posterior left corpus quadrigeminum, a grey spot was also visible, and there were several on the thalamus opticus, and at the lower surface of the corpus callosum. All these spots were of firm consistency and tolerable thickness.

It is a fact of special interest, that the disease of the spinal cord, *e.g.* meningitis, which in infancy may have given rise to paralysis, may have ceased, while the immobility is maintained and increased by progressive degeneration and distortion of the extremities, in the same way as the muscular affection resulting from spasm, may be separated from the cause which has produced it, and remain as a shortening of the muscular fibres. T. Heine[1] has added a valuable contribution to our knowledge of these states, by the publication of the observations which his Orthopœdic Institution in Cannstadt afforded him the opportunity of making, and by which he has earned an enduring reputation. The origin of these affections may generally be traced back to the first period of dentition; or to some acute diseases, such as an exanthematic fever; after which, and subsequent to an attack of convulsions, or, though rarely, without them, the child which was previously in good health, is found to be paraplegic; the upper extremities, and in rare cases, the bladder and the rectum being implicated. The paralysis is afterwards confined to one or both lower extremities, in an equal or different degree. Sensation almost always continues normal. Movement is not entirely abolished, generally continuing in the thighs, though in a less degree, while the function is almost entirely destroyed in the legs and feet. The patient is generally entirely unable to walk or stand, even when the trunk is supported, and locomotion is confined to crawling. The temperature of the legs and feet is considerably below the average; it sinks as low as 14°—17° R., (64°—70° F.), and the colour of the surface is livid. The extremities are invariably atrophied; we less frequently observe an arrest in the general development of the body. The deformity of the limbs becomes more marked with the progress of years, and shows itself in distortions of every variety—contraction of the knee and hip-joint, varus, and inversion of the knees. The trochanters and the patellæ remain imperfectly developed, and the tubular bones present a smaller circumference than they have in health. In the further advance of the disease, curvatures of the vertebral column form in the dorsal and lumbar region. No injurious influence is exerted upon the general health and the duration of life. I am acquainted with one patient who, although obliged to be carried from one chair to another, has married in his fortieth year, and become the father of a healthy progeny.

---

[1] Beobachtungen über Lähmungszustände der untern Extremitäten und deren Behandlung; Stuttgart, 1840.

Our therapeutic proceedings must be directed towards removing the secondary local causes of immobility. All attempts at a cure directed against an assumed morbid state of the spinal cord, whether exudation or inflammation, and the application of leeches, issues, nux vomica, electricity, &c. will prove fruitless; while those remedies which tend to encourage nutrition, to remove the contraction and flaccidity of the muscles, and finally to change the shape of the distorted bones, will prove useful; whether we take them from the range of mechanics, of surgery, of the materia medica, or avail ourselves of all three. The delineations of the patients before and after treatment, which the above-mentioned work contains, prove how the continued use of water and vapour baths, frictions, movements of extension and flexion, and tenotomy,[1] assisted by standing and walking exercise (rendered possible by ingenious mechanical contrivances), may improve and cure malformations which at first sight appear incurable, and have originated in an early affection of the spinal cord.

The causes and treatment of the other paralyses dependent upon the spinal cord as a conducting apparatus, will be investigated in the fifth part of this manual; in which the diseases of the formative sphere of the nervous apparatus will be discussed.[2]

In the delineation of spinal spasms, we have already pointed out that the spinal cord is distinguished from the peripheral tracts as a conducting apparatus, by not only representing the sum of the individual nerve-fibres of the nerves, but also by being provided with a disposition of the elementary fibres, which renders the stimulation for definite combinations of movements possible. In contradistinction to the movements produced by spasm, such as we see in chorea, there are paralytic conditions in which this associating faculty is abolished. This derangement is most clearly marked in the extremities, not only by the inability to effect flexion or extension, pronation or supination, adduction or abduction, inversion or eversion, but also by the preponderance of antagonist groups of muscles; this frequently gives rise to peculiar positions and distortions, and a knowledge of the circumstance will much facilitate diagnosis. Thus, the paralytic pes equinus or varus is characterised by great flaccidity of the limb, and the facility with which it may be restored to its normal position; and it is distinguished from other varieties of the same disorder by the emaciation and flabby state of the entire limb.[3] An observation communicated by Longet[4] was the first that contained an accurate anatomical examination of the muscles and nerves of the paralytic varus. The case occurred in a girl of 5 years, affected with varus of the right foot. The extensors of the toes and the peroneal muscles were extended and completely paralysed; the triceps cruris, the tibialis anticus and posticus, were moderately contracted, and like the flexors of the toes continued in the possession of their contractile power. The entire leg was visibly emaciated, and sensibility was normal. The operation of the varus in a short time had a beneficial result, but the child was seized with smallpox six weeks after. During this disease the varus had partially returned.—*Sectio cadaveris.* The tendo achillis and the tendon of the tibialis anticus were found to have reunited perfectly; the pallor of the paralysed muscles was marked, while the others presented an almost normal colour, though somewhat paler than in the healthy foot. The pallor also extended to some of the muscles of the thigh, the biceps, the vastus externus, and the tensor fasciæ latæ. In the two former, some red fasciculi were seen in juxtaposition with the pale ones. The discoloration affected the entire length of the fibres in the muscular fasciculi. The nerves of the right leg were thinner than those of the left extremity. No marked change was perceptible in the spinal cord, or the brain; but the anterior roots of the lumbo-sacral nerves forming the right sciatic nerve, had scarcely one quarter the diameter of the corresponding nerve of the left side, while the posterior roots of both sides presented the proper thickness. The atrophied roots had a brown and almost ochrey colour. Only one of them had escaped atrophy and discoloration.

---

[1] Consult V. Breuning; Wiederbelebung gelähmter Gliedmassen durch den Sehnenschnitt; Wien, 1844.

[2] [This refers to an unpublished portion of the Work.]—Ed.

[3] Anatomie et Physiologie du Système Nerveux, vol. i, p. 358.

[4] Dieffenbach über die Durchschneidung der Sehnen und Muskeln, p. 214.

Lead poisoning is the specific cause which most frequently induces paralysis of groups of muscles, associated for certain acts of motility.

CHAPTER XLVII.

SPINAL PARALYSIS.

PARALYSIS SATURNINA.

THE upper extremities are mainly the seat of the affection; the lower are rarely involved, and when they are, it is almost exclusively in connection with paralysis of the former; the proportion is about 1 to 6. The paralysis occurs on one side or on both; in the latter case, the corresponding muscles or others, and most commonly the extensors, supinators, and adductors, are affected. The fingers and hands are most frequently paralysed. The middle and ring finger are often alone deprived of the power of extension, and flexed in a right angle upon the hollow of the hand. In a female who was in the habit of handling printers' types, I not long since found the thumb of the right hand affected alone; the abductors and extensors were paralysed, but the adductor, flexor and opponens were exempt. In other cases, the extensors of all the fingers are paralysed and bent inwards towards the hand, though not to the same degree. The patient is able to close his hand voluntarily a little more, but he cannot control the opening; the fingers only return to their semiflexed condition when the impulse of the will ceases to impel the flexors; the extensors are not actively engaged. Tanquerel des Planches[1] remarks, that flexion is not effected as perfectly as in health, because the paralysed extensors are deprived of the elasticity requisite to produce the necessary elongation. The hand is either paralysed alone, or in conjunction with the fingers and the forearm. In the first case, paralysis of the radial and ulnar extensors of the wrist renders every extension impossible; the hand continues rigidly bent upon the forearm, and is therefore unable to execute the movements of adduction and abduction. If the forearm is also paralysed, it will be bent upon the upper arm, and with the hand participates in the loss of supination, so that on account of the preponderance of the pronator teres and quadratus, both are in a state of permanent pronation, and the hand also assumes the position above described. The upper arm is most frequently deprived of its movement upwards from paralysis of the deltoid muscle, while the forwards and backwards movements continue unimpaired, owing to the pectoralis major and latissimus dorsi not being affected.

---

[1] Traité des Maladies de Plomb, vol. ii, p. 42; Paris, 1839.

Paralysis of extension induces abnormal positions in the lower extremities as it does in the upper; the clubbed foot, like the clubbed hand, equally results from the extensors of the feet and toes being paralysed. The toes are drawn in towards the sole; the foot points downwards and forwards, and the plantar surface is concave. The movement of the foot towards the leg, as well as adduction and abduction, are arrested. The extensors of the leg, the rectus femoris, the cruralis and the vasti, are chiefly paralysed; the leg is half bent upon the thigh, the patient is unable to raise the extended leg, and finds it easier to go up stairs than to descend. If he happen to lie on his knees, he is unable to raise himself without assistance.

Lead palsy is not always limited to these muscular groups; but if neglected, and if the noxious influences be not avoided, the affection extends to the entire extremities of one or both sides; but still the flexors remain less impaired than the extensors; the elbow, wrist, and finger-joints, therefore, continue in a state of moderate flexion, and the forearm and hand occupy a position halfway between pronation and supination. We never find the muscles rigid, and as little are the sphincters implicated in the paraplegic form of the disease. The paralysed muscles are frequently the seat of a vibrating movement, whereas tremor, like that following mercurial poisoning, is not met with.

This form of paralysis is characterised by atrophy of the muscles and the surrounding cellular tissue and fat, supervening earlier, more rapidly and extensively than is the case in other spinal paralyses; this symptom cannot therefore be regarded as a mere result of inactivity. The outline of the muscles disappears; the posterior and external surface of the forearm, the anterior surface of the thigh where the extensors are placed, waste away and form a striking contrast with the prominent condition of the flexors. In higher degrees of the malady, depressions and fossæ form, which are surrounded by adjoining healthy muscles. At last the muscular tissue disappears entirely, and allows eminences of the bone to project sharply; this may be seen in the deltoid[1] and in the ball of the thumb, which comes to be level with the hollow of the hand.

Sensation is manifested in the majority of the patients; they perceive the loss of motility as a feeling of heaviness, and more particularly as if a weight were attached to the joints. If the arm is raised, and be then allowed to fall down, the patient complains of pain in the axilla, and in the shoulder. There is often a troublesome sense of coldness. In rare cases neuralgic pains accompany the affection; still less frequently we meet with cutaneous anæsthesia.

If the paralysis continues for a length of time, the permanent contraction of the pronators and flexors gives rise to an arching of the back of the hand. Small hard tumours may then occasionally form on the wrist and hand; they were noticed by De Haen and Stoll, and have erroneously been taken for accumulations of inspissated synovial fluid. Tanquerel[2] has investigated the matter in the dead subject, and has found that they are produced by the ends of single carpal and metacarpal bones riding over one another, which may be owing to an elongation and relaxation of the ligaments.

This form of paralysis is rarely a primary affection, it follows or accompanies lead colic, and most frequently supervenes gradually when the latter ceases; it less frequently occurs simultaneously, with a coincident increase and diminution of the paroxysms, and least of all suddenly during the course of the colic, and so as to interrupt it. The majority of the patients only pass through one, two, or, at the most, three attacks of colica pictonum, previous to the supervention of the paralysis, and they are not in any way marked by their intensity. Many remain exempt from the latter as soon as they fall ill with the paralysis. In others the imperfectly cured paralysis is augmented after every fresh attack of colic.

There are other sequelæ of this poisoning which co-exist with the lead palsy. Among these the cachexia occupies the first place. It is proved by the pale yellow complexion, the sallow earthy hue of the skin, the weak, indolent beat of the heart and the arteries, and the œdema. Andral[1] found that the blood corpuscles were much diminished, while the fibrine and the other constituents of the blood were not implicated. The powers of reproduction are sunk; there is general emaciation, and a state of marasmus. The lead palsy generally supervenes slowly, and is preceded by weakness, numbness, clumsiness, and great susceptibility of fatigue. When an entire extremity is affected, it generally takes a downward course, commencing at the upper arm or thigh. The disease lasts a long while; it generally extends over several years, with an alternation of amelioration and exacerbation of the symptoms. Occasionally the hypoglossus, the vagus (its recurrent branch), and the nerves of the respiratory muscles, are drawn within the range of the paralysis; in the latter case, the fatal issue will be accelerated, which, under different circumstances, may be induced by apoplexy, or by complication with other diseases.

---

[1] Vidi ac demonstravi in nosocomio, Deltoidis utroque in latere sic evanuisse carnem, ut ejus loco nihil nisi membranaceum quid tactu perciperetur. De Haen; Ratio Medendi, vol. x, p. 100.

[2] Loc. cit., pp. 44, 139, 150.

The post mortem investigations made by Andral,[2] Gendrin,[3] and Tanquerel,[4] are very satisfactory, both as to number and accuracy, and they agree as to the absence of perceptible changes in the central and peripheral nervous apparatus. In only one case the ulnar and radial nerves were found atrophied; and only in two there was an appreciable amount of serum within the cavity of the cranium and the vertebral column. The paralysed muscles present the following appearances: the muscular fibres lose their original form and are atrophied, they present a pale-yellowish or whitish colour, become friable, sometimes dry up, as if mummified, and contrast strongly with the fleshy and normal appearance of the other muscles. Molecules of lead are stated to have been discovered recently by chemical analysis, in the paralysed extensors; the ligaments are more flaccid, easier torn; the synovial fluid is scanty, and of a yellowish colour; the extremities of the articulations of the bones of the head are found deprived of their smooth, shining surface.

---

[1] Essai d'Hématologie Pathologique, p. 52.

[2] Clinique Médicale, vol. ii. p. 227.

[3] Traduction des Maladies de l'Encéphale par Abercrombie, 2d edit. p. 576.

[4] Loc. cit., pp. 77, 144, 149.

The predisposing cause of this paralytic affection is lead, in whatever manner and by whatever passages it may have entered the blood in a molecular state of oxidation; for we possess no satisfactory proofs of its directly paralysing the motor nerves in their peripheral distribution. The strongest evidence against this assumption is afforded by the following facts: that the extensors are more liable to the affection than the flexor muscles; that the paralysis is limited to the fingers in persons who have to handle it, like type-founders, printers, and those who roll out lead; that the paralysis is induced by lead poisoning, by adulterated wines, by water, and beverages which have been kept in leaden vessels, and even by the medicinal use of acetate of lead; and, lastly, that the respiratory and lingual muscles are affected. An atmosphere impregnated with lead is the most frequent cause of lead poisoning; for this reason persons working in sugar of lead manufactories are most liable to it, and the effect is not confined to human beings, but also extends to animals. The horses employed in the mill are subject to roaring, owing to paralysis of the vagus; and they can only be kept alive by tracheotomy. Rats living in sugar of lead factories may be easily caught and killed on account of their hind legs becoming paralysed. Workmen occupied with rubbing up the red and white oxides with turpentine and other oils are also very frequently affected with the disease. The development of the malady is favoured by the abuse of spirituous liquors, by venereal excesses, want of cleanliness, and cold.

Besides lead, we find that arsenic may also give rise to paralysis.[1] Sir Benjamin Brodie[2] found in his toxicological experiments upon animals that half an hour after the poisoning paraplegia supervened, while Tanquerel and others have failed to induce lead poisoning in animals artificially. In the cases hitherto published, the characteristic signs of paralysis saturnina were absent; both lower extremities were seized,[1] or it affected also the flexor muscles, and was accompanied by loss of sensation.

---

[1] Christison—On Poisons, 2d ed., p. 292.

[2] Philos. Transact., 1812, Part 1, p. 212.

Circumstances favouring recovery are, the recent occurrence of the paralysis, its being limited in extent, the atrophy being moderate, the patient being young and robust, and the spring and summer seasons.

It is impossible to cure the paralysis or to prevent its return unless the noxious occupation is given up. The cure is much promoted by sojourn and exercise in the open air, when the atmosphere is dry and warm; this in itself suffices to remove some of the milder forms of paralysis. The most trustworthy remedies are, nux vomica, electricity, and warm baths. Strychnine may be appropriately exhibited both externally and internally; when applied endermatically, even the smaller doses, [illegible], [illegible], and [illegible] grain, should be carefully watched. The blisters should be applied upon and in the vicinity of the paralysed parts; among forty patients treated by Tanquerel with this alkaloid, there were only four in whom no perceptible effect was observable. The duration of the cure on an average was two months.

The warmest advocate of the employment of electricity, De Haen, states that, combined with other remedies, it is the most effectual agent we possess:[2] calculo iterato subducto evictum est, virtutem electricam cum cæteris artis præsidiis, quæ solida fluidaque ad eandem aptent, paralysin expeditius curare quam absque illis. It is most essential that whatever form of electricity be exhibited, whether electro-puncture or electro-magnetism, we should persevere in its use. Among the baths, the sulphur baths are the most efficacious; those artificially prepared are valuable, but the natural thermæ are considerably more so. After the first bath a blackish precipitate of sulphuret of lead is often perceived at the extremities. Dry frictions and inunctions, with the ethereal oil of turpentine, and with the unguentum nervinum, are to be recommended. Pemberton states that when the hands are paralysed the cure is promoted by applying splints to the volar or flexor surface. When entire limbs are paralysed, the recovery takes place from above downwards; the activity of the skin is stimulated and the volume of the muscles is restored.

---

[1] De Haen; Ratio Medendi, vol. ix, p. 240.

[2] Loc. cit., p. 109.

It is not always lead poisoning that gives rise to this particular form of paralysis. It is met with in individuals in whom the most careful examination fails to show an influence of this kind. But in this case it is not limited, nor does it exclusively affect the extensor muscles, but also attacks the flexors. It is uniformly accompanied by atrophy, while sensibility generally continues unimpaired. Bell[1] possesses the merit of having first described this variety, in the following words:

"The paralysis does not extend to a part of the arm or leg, nor is it a defect reaching so far up the limb or so far down the limb, but it is an affection of the muscles which are naturally combined in action, although these muscles be in different parts of the extremity and are supplied by different nerves as they are by different arteries. For example, the muscles of the thumb may be affected, but then the wasting will not be confined to the short muscles of the ball of the thumb, but will extend to those muscles of the thumb which lie upon the fore arm; and these wasted muscles are seen lying in contact with others which are plump and powerful."

The following case, observed by the same master of our art, which has been published in an edition of his works that has appeared since his death,[2] well deserves a place in this work: "In a man 40 years of age, who had formerly been a coal-heaver, the flexors of the left hand and fingers, and the muscles of the thumb, were much atrophied; the extensors of the hand and four fingers and the supinators were normal. The muscles forming the ball of the thumb were so much atrophied that a considerable depression was visible between the metacarpal bones, and the flaccid skin lay immediately over the bones. Among the muscles lying at the outer side of the fore arm, which presented their usual dimensions, the three extensors of the thumb were remarkably emaciated, and in this point resembled the muscles enveloping the thumb itself. The movements of the thumb were entirely destroyed, the power of

---

[1] The Nervous System, 3d ed., p. 429.

[2] The Nervous System of the Human Body, with additions, 3d ed.; London, p. 432.

[illegible] The general health was good [illegible]

[illegible] cases of paralysis. The first occurred in a [illegible] whose malady coincided [illegible] excepting that the paralysis of the fore arm and hand affected the right side, and that of the upper arm and shoulder the left side. Sensibility was complete, but the atrophy at last extended to such a degree that nothing but skin and bone, with all their prominent points, was to be felt. The skin was not dry and jagged at the paralysed parts, but soft and moistened with perspiration as in health. Death ensued ten years after the supervention of the paralysis, from phthisis pulmonalis. Unfortunately, a post-mortem examination was not permitted.—The second patient, a foreign merchant, aged 52, who had formerly suffered from hæmorrhoids and gout, was attacked two years and a half previously to consulting me with severe pains in the left shoulder, which extended along the arm to the head; it was followed by a sense of dull numbness in the index and middle fingers, although the skin of the fingers continued very tender to the touch. The entire arm lost its former strength and usefulness. During the following year, while using the cold douche, the tips of the fingers of the right hand died away, and soon after they became very weak. A year after, the muscles of the left thumb were observed to become atrophied, and a few months later those of the right also; no neuralgic pains in this arm having preceded. It is not long since some tenderness has manifested itself in the skin of the right thigh; the sphincters continue in the full possession of their vigour.—The third case exhibits the disease in its highest development and extension, with the phenomenon of oscillation of the muscular fibres. W. S., aged 36, a waiter, formerly in the enjoyment of robust health, was seized three years ago with vibrating movements in the ball of the right hand, which was associated with remarkable weakness of the thumb. Soon after, the other fingers also became affected, the weakness and the oscillations extended over the fore and upper arm, then travelled to the pectoral muscles and passed to the left arm, which soon presented the same condition as the right one. From the commencement, the parts affected became emaciated. After a year and a half the patient applied for medical advice, but all measures that have been adopted hitherto have failed to arrest the disease. In March, 1845, the following was the condition of the parts: both extremities were paralysed, the only way in which the patient was able to raise the arms was by moving the trunk in a corresponding direction, so that the arms were thrown up. The fore arm and hand were weaker than the upper arm; he was unable to close his hand firmly. The patient was so helpless as not to be able to dress or undress, or even to eat, without assistance. At intervals, as often as twenty times a day, painless contractions of the left middle finger occurred; for the previous six months debility of the lower extremities had supervened, the individual was unable to stand for any length of time; his walk was heavy, and at night there was frequent spasmodic action in the calves of the legs, by which the toes were drawn up; the patient tried to overcome it by forcibly pressing the soles of his feet against the bed-posts. The atrophy of the muscular tissue was most evident in the muscles of the ball of the thumb, in the flexors and extensors of the fore-arm and fingers, in the biceps, which resembled a mere membranous expansion, in the triceps and deltoid, owing to which the shoulder-joint had lost its rounded outline, and [illegible] as if it was [illegible], and in the supra-spinatus and serratus anticus major. In a lesser degree the pectoral muscles, the latissimus dorsi, trapezius and sterno-cleido-mastoid, presented symptoms of atrophy. An oscillation of the muscular fasciculi was perceived to prevail over the whole body; it was much augmented by the influence of the cold air after undressing, and the patient himself was sensible of it. It was most marked in the upper extremities, in the thoracic, cervical, and dorsal muscles, slightly in the abdominal muscles, and was entirely absent in the face. For some time past, the vibrations had also manifested themselves in the muscular fasciculi of the tongue, by which articulation and deglutition were much impaired, although the tongue continued freely moveable in all directions. The function of sensation was so vivid that the patient could distinctly feel a fly crawling over his hand. His health was unimpaired in other respects; micturition and defecation were normal, and he was still able to perform the marital duties. At the time of the examination, the muscles of the neck had become paralysed, so that, unless supported, the head fell forwards.

The cause of the affection often remains a mystery; neither my own patients nor those of Sir C. Bell had ever handled lead, and they showed none of the other symptoms of the lead poisoning. This form of paralysis is said to occur frequently in England among individuals carrying heavy weights on their back and shoulders.[1] Occasionally a distinct rheumatic exciting cause may be demonstrated. Tanquerel[2] relates the case of a tailor who being intoxicated went to sleep in a shady place from four to ten o'clock one evening, and on waking up, found himself afflicted with paralysis of the extensors of the hand and fingers. The merchant above mentioned, after several attacks of influenza, retained an extreme sensitiveness of the skin to the slightest changes of temperature and to atmospheric influences, and from this time he had suffered from an annoying sense of tremor and vibration in the muscles. The waiter traced the commencement of his illness to a violent cold, caught by cooling himself in a damp garden cellar when he was copiously perspiring after violent fatigue. One of Sir Charles Bell's patients had immersed his arm, while dripping with perspiration, into a tub of cold water, and had held it there for a time; this was followed by tremor and subsequently by paralysis and atrophy of the upper arm. This form of paralysis has occasionally been met with as a sequela of acute exanthemata. The prognosis is very unfavorable; in none of the cases hitherto published has the treatment (electricity, strychnine, champooing, douche, moxæ, setons, the Russian vapour bath, &c.) proved of the slightest avail, either in curing or in arresting the disease. Possibly the persevering use of the waters of Gastein or Wildbad might prove beneficial.

---

[1] See Cyclopædia of Practical Medicine, art. Paralysis, p. 251.

[2] Loc. cit., p. [illegible]

CHAPTER XLVIII.

SPINAL PARALYSIS.

II. PARALYSES DEPENDENT UPON THE SPINAL CORD AS A CENTRAL ORGAN.

A diminution and loss of the reflex action as well as of the generation of the motor power characterise this form of immobility and paralysis; it is a subject which presents great difficulties, and we are yet but imperfectly acquainted with its history; continued research is necessary for its elucidation.

REFLEX PARALYSIS.

While we are possessed of physiological facts by which we may estimate and interpret reflex spasms, we are lamentably deficient in our interpretation of reflex paralysis. Excepting the influence exerted by the fifth upon the arrest of the facial movements and of the optic in producing immobility and dilatation of the pupil, we have not as yet obtained any results by experiments upon living animals. I have been the more anxious to supply the defect by pathological observations. I remind the reader of the altered balance of movements in amaurosis, of the dumbness caused by anæsthesia of the acoustic nerve, and of the reflex immobility of the muscles of the facial, ocular, respiratory, vocal and vesical muscles. But the site of the loss of centripetal excitement is only too often concealed; and although the diagnosis of reflex paralysis is facilitated by the faculty of producing movement by the impulse of the will, the duration of the excitability is limited, because the longer the reflex influence is arrested, the less susceptible the motor apparatus becomes for cerebral stimulation; on the other hand the faculty belonging to the spinal cord as a central organ of communicating its conditions gradually widens the limits of the original affection. The most difficult point undoubtedly is to determine the sensitive source of reflex action in the range of the sympathetic, whose stimulating influence upon spinal nerves through the intervention of the spinal cord has been proved by experiments upon animals as well as by pathological facts. Convulsive movements of one or both hind legs, less frequently of the fore legs, are produced by pinching up with the forceps a portion of intestine, mesentery, bladder, ovary, or an intestinal nerve, in a decapitated frog or suffocated rabbit.[1] Experiments with an opposite paralysing effect can scarcely be looked upon as convincing, unless entire organs are detached from their nervous connections. The experiments of Comhaire upon the kidneys, though instituted with a different view, come under this category. Extirpation of a kidney in living dogs instantly induced a paralytic weakness in the hind leg of the same side. The mere incision through the skin and muscles failed to produce this effect. Both in human beings and animals morbid states produce similar effects, which have hitherto been attributed to a direct pressure of the viscus upon the nervous plexuses of the extremities, although neither tumour nor induration could be traced by which to account for the compression, and although there is neither a plexus nor a trunk of a nerve in the vicinity, nor any pain was manifested in the paralysed parts, a symptom inseparable from traction of sensory fibres of the spinal system. Besides the experiments of Comhaire afford a convincing proof to the contrary.[2]

The stimulating and invigorating influence exerted by the hygienic relations of our abdominal viscera has not as yet been duly estimated, although phenomena of daily occurrence point to it, viz., the activity or indolence of our legs according as the alvine evacuations are easy or retarded. Nor is there only a generally stimulating and invigorating influence, but we find in paralytic states, as in reflex spasms, a relation existing between sensory and centripetal nerves and definite motor tracts, which can only be referable to a peculiar disposition in the central apparatus. It naturally suggested itself that the brain, like the sympathetic, contains a number of distinct motor

---

[1] Valentin; Lehrbuch der Physiologie des Menschen, vol. ii, p. 756.

[2] Dissertation sur l'Extirpation des Reins; Paris, 1803.

"Mr. B., aged 73, was remarkably strong and healthy, though of a spare habit. He was able to take a great deal of exercise, capable of enduring much fatigue, and passionately fond of hunting, fishing, and shooting, particularly the latter; and in pursuit of his favorite amusements frequently exposed himself to wet feet during his excursions through bog and lands, and when wading in the water. These habits, however, he laid aside after the occurrence of the first attack of his illness, which happened in 1829. He had for many years been of a costive habit, his bowels being frequently confined for a week at a time, but did not experience any sensible bad effects from this circumstance, and never took any aperient medicine. Since the first attack in January, 1829, this state ceased, and his bowels became ever after inclined to looseness, which always increased before the appearance of one of the attacks, accompanied by griping, nausea, and inclination to vomit. Each attack was generally preceded by a copious secretion of insipid watery fluid in the mouth, and then the characteristic symptoms of his disease commenced. These consisted in obstinate and protracted nausea and vomiting; he first threw up whatever happened to be on his stomach at the time, and afterwards every thing he swallowed, whether solid or liquid. The matter ejected was at first acid, and afterwards bitter, varying in colour from mucous to bilious, but being generally of a greenish, and occasionally of a bluish tinge. The greenish fluid annoyed him much from its extreme bitterness, and the quantity thrown up in the course of a day varied from three to four quarts of fluid. He complained also of pain referred to the stomach or lower part of the chest, which continued throughout the attack, being more acute at its commencement; for the last year this feeling had passed into a sense of painful constriction, which he described as a contracted feeling of his inside, and compared it to something like the effects of a cord drawn tightly, so as to compress or strangulate his body, exactly along the outline occupied by the insertions of the diaphragm. During the prevalence of the attack he had profuse perspirations, particularly towards the termination of each paroxysm. The duration of the first attack did not exceed five or six days, after which he became quite well, and continued so for [illegible] months, when his symptoms suddenly returned. He began to reject everything from the stomach as before, but in the course of a few days the vomiting disappeared, and for a considerable interval he had no return of the complaint. In the year 1830, he had three attacks of a similar description; from these he also recovered completely, and without remarking any diminution of power in his lower extremities. In 1831, however, the disease began to assume a more serious aspect; the paroxysms became much increased in severity, lasted longer, and recurred at shorter intervals. For one of these attacks he took mercury, and was salivated. In 1832 his symptoms became still more violent, and the duration of the paroxysms more protracted. He had one in March, a second in May, a third in June, each of which was accompanied by some numbness and loss of power in the lower extremities. This, however, was slight, and disappeared altogether as the vomiting subsided. About this time he noticed that his urine was scanty, and deposited more sediment than usual. He also complained of being very apt to catch cold whenever he got out of bed, and stated that he suffered occasionally from severe twitches and pains in his legs, thighs, arms, and other parts of his body, which were generally succeeded and carried off by profuse perspirations.

"In August, 1832, he had a violent attack, which lasted nearly a month. The vomiting was incessant, continuing night and day, and he suffered severely from the painful constriction already described. On getting up after this attack, his legs suddenly failed him, and he dropped down on the floor quite powerless. The paralysis did not now disappear during the intervals, although it grew somewhat better after each fit of vomiting had ceased; indeed he used to improve in his walking after the paroxysm had entirely disappeared; and aided by two sticks supported himself so as to give some hopes of a recovery, until a recurrence of his attack reduced him again to a state of almost total paraplegia. His legs now began to waste sensibly, and he noticed that they had lost their feeling and were remarkably cold. He also complained of severe twitches of pain in various parts of the body accompanied by profuse night sweats and turbid scanty urine.

"For some months before his death he was completely paraplegic, and continued to be attacked with violent fits of vomiting. The vomiting went on night and day, and he was unable to retain the mildest and most soothing substances for a moment on his stomach. Mr. Crampton and Dr. Ireland attended him with me, and we had recourse to everything we could think of to allay the irritability of his stomach, but in vain. After continuing to resist obstinately every form of treatment for five or six days and nights, the vomiting would suddenly cease; the gentleman would exclaim, "Now I am well," and he could then eat with perfect impunity substances which would prove irritating and indigestible to many stomachs. This was one of the most singular circumstances I ever witnessed. The transition from a state of deadly nausea and obstinate retching to a sharp feeling of hunger used to occur quite suddenly. One hour he was the most miserable object you could behold, racked with painful constrictions across the epigastrium, alternately flushed or bathed with cold perspiration, and rejecting everything from his stomach, the next found him eating with a voracious appetite whatever he could lay hold of, and digesting everything with apparent facility.

"No trace of organic disease could be detected in his abdominal viscera, and there was not the slightest tenderness over any part of the spine. He also retained to the last a complete control over the bladder and rectum.

"At length his system began to give way; long confinement to bed, and frequent recurrence of these exhausting attacks, completely wore him out, and he sank on the 30th September, 1833. A post-mortem examination was allowed by his friends, and we scrutinized every part of his system with the most anxious care. The brain, cerebellum, spinal cord, and their investing membranes, were carefully inspected. We examined the large nervous trunks that supply the lower extremities, inspected the viscera of the thorax, and searched for evidences of disease in the stomach and intestinal tube. We could find none. There was no lesion of the brain or spinal cord, no thickening or vascularity of membranes, the large nerves exhibited their normal condition, the stomach was perfectly healthy, the intestinal canal natural, the liver and other glandular viscera of the abdomen without any trace of appreciable derangement."

[illegible] that all the muscles of the extremity are affected after the attack of colic, but, as in lead palsy, [illegible] and especially the extensors of the hands and fingers, which readily become atrophied. In the cases on record which have been accurately detailed, among which we mention two that are particularly instructive, contained in the Extracts from the unpublished Medical Writings of the late Robert Pitt,[1] it is expressly stated that there was no ground for suspecting lead poisoning. Occasionally the disease may be traced to catarrhal influences and the abuse of wine and spirituous liquors. I remember a case of the kind occurring in one of our most distinguished actors, whose too free libations to Bacchus were the undoubted cause of the malady.[2]

Besides this intestinal affection, for which I have retained the objective term colic, because, as I remarked on a former occasion, I look upon the pain and the [illegible] tendency not as a symptom of neuralgia or spasm, but rather as the painful effort of the upper portion of the intestine to overcome the resistance caused by the immobility and paralysis of the lower,—besides this affection, there are other diseases of the intestinal canal which enter into a relation with paralysis of the extremities. Thus we find that during enteritis paraplegia may supervene, which will continue after the cure of the former until the death of the patient, without exhibiting any structural changes. Graves[2] communicates several cases observed in man, and it has also been met with in animals, such as horses and cows.[3] Paralysis has also been observed to occur in conjunction with dysentery. Thus Frank[4] says, in reference to this subject, "The pain occasionally rises to such a pitch in some individuals, that, as in lead colic, a paralysis of one or the other foot may result." The following description is taken from an old dissertation by Fabricius, 'De paralysi brachii unius et pedis alterius dysentericis familiari.'[1] "Some persons who suffer from epidemic dysentery, and more particularly from the severer form, having at the commencement neglected to employ mild evacuants, and especially rhubarb, or having at once taken too large a dose of astringents or opiates, arrest the painful sanguineous discharge and seem to recover to a certain extent, but are at the same time seized with immobility of one arm and the foot of the opposite side; with this symptom violent arthritic pains are occasionally associated, but most frequently these patients lose all sensation. This affection persists in the limbs once attacked, or leaves them to settle in the opposite extremities; unless treated by suitable remedies, it frequently lapses into an incurable paralysis."

---

[1] London, 1825, vol. i, pp. 527 and 533.

[2] Loc. cit., p. 401.

[3] Journal Pratique de Médecine Véterinaire, 1829, p. 549; Receuil de Médecine Véterinaire, 1829, p. 350; and Dr. Henoch's Abhandlung über vergleichende Pathologie der Bewegungs-Nervenkrankheiten der Menschen und der Hausthiere, in—Denkschriften des Deutschen Vereins für Heilwissenschaft, vol. i, 1845, p. 51.

[4] De curandis Hominum Morbis, lib. v, p. ii, p. 497.

In treating these forms of paralysis we but very rarely have occasion to pay any attention to an inflammatory affection of the intestinal canal; because, though present in the first instance, it has now become extinct and has left great torpor. It is this condition that must be attacked as the older physicians have done before us, whose finer appreciation of the action of remedies may yet serve as our model. Among the drugs there are three that deserve especial mention, colocynth, gratiola, and helleborus niger; they should be given cautiously, so as to stimulate and avoid all drastic action. Colocynth may be given in the form of tincture, from 5 to 10 drops, by itself or combined with equal parts of the tincture of hellebore, from ⅓ to ½ a grain of the extract of colocynth three times a day in pills, with an addition of about ⅙th of a grain of squills. Baths, and especially the mineral waters of Marienbad and Wiesbaden, according as the character of the individual is erethic or torpid, are to be recommended. Intestinal baths exhibited by means of enemata, to which we may add stimulant substances, are appropriate in these cases. With these remedies we may combine the use of friction, counter-irritation of the abdominal surface and the extremities, by flying blisters, electric shocks, the douche to the abdomen, the spine, and the extremities, and the internal administration of nux vomica, (the spirituous extract in doses of ¼ to 1 grain.) We should avoid applying issues to the spinal column.

---

[1] Helmstadt, 1750, to be found in Haller's—Disputationes ad Morborum Historiam et Curationem Facientes, vol. i, p. 104.

2. *Reflex Paralysis dependent upon Affections of the Urinary Organs.*—We have already discussed the influence that injuries and diseases of the spinal cord exercise upon the kidneys and bladder; we now have to consider the action of diseased urinary organs upon the spinal nervous centre. Stanley, Stokes, and Graves have recently published cases which are intended to demonstrate that paraplegia may result from renal disease; these authors lay a great stress upon the fact that the post-mortems exhibited no lesions in the brain and spinal cord. This statement will not be received with implicit faith unless the organs in question and their envelopes are examined by a professed anatomist; and cases may be quoted in which, notwithstanding the renal disease and the healthy condition of the spinal cord, a morbid alteration was found in the vertebræ, or even in the ligaments of the spinal column.[1] This renders it the more imperative to look for further facts that may serve as evidence of the connection adverted to. We have already mentioned the convincing experiments of Dr. Comhaire on the production of paraplegia by the extirpation of the kidneys in dogs. A similar effect is produced by over-doses of diuretic medicines in human beings and animals. Sir Benjamin Brodie[2] relates the case of a man, aged 63, who by mistake swallowed a liniment containing a large quantity of tincture of cantharides, and in spite of an emetic taken three quarters of an hour after, was seized with paralysis of both inferior extremities and ischuria. During the first weeks it was necessary to evacuate the urine by the catheter; subsequently the patient recovered the power of voluntarily discharging his urine, but he suffered from constant dysuria. After the lapse of four years the paralysis was so much improved that he was able to walk with the aid of crutches, but the painful symptoms continued; occasionally he was seized with a sudden desire to micturate, and discharged a small quantity voluntarily; at other times the urine passed off without the patient's will or knowledge. Sir Benjamin found the bladder empty when he applied the catheter.

---

[1] Key—On Paraplegia depending upon Disease of the Ligaments of the Spine, in Guy's Hospital Reports, vol. iii, pp. 17—34.

[2] Lectures on the Diseases of the Urinary Organs, 3d ed., p. 115.

Cases are recorded in which horses that were affected with pneumonia had two ounces of cantharides ointment rubbed into the side of the thorax within a period of twelve hours; copious diuresis ensued, and great thirst, and in these horses the gait became tottering, they could no longer stand on their hind legs, fell down, and remained immoveable.[1] Veterinary surgeons have observed the coexistence of paraplegia and nephritis, and the coincident cessation of both diseases on the application of antiphlogistic remedies.[2] Among the observations in the range of human pathology, those possess a critical value in which the disease commenced in the urinary organs, *e. g.* in gonorrhœa. Such an one is the fifth case published by Mr. Stanley:[3] in a young man, aged 22, ischuria resulted from a violent attack of gonorrhœa being arrested by injections, and at the same time paralysis of the sphincter ani supervened, with a diminution of motility in the lower extremities. The pulse was 120, quick and hard, the abdomen, especially in the hypogastric region, tense, distended, and tender to the touch. The pain extended upwards from the bladder to the left kidney, and then across to its fellow. The legs became remarkably flaccid, and completely paralysed; it was only in the thigh that some sensation remained. Enuresis took place; the urine discharged from the bladder was dark, fetid, and mixed with mucus. The tongue became dry, and death ensued from decubitus and complete retention of urine. The kidneys were larger than usual, very soft, and much congested. Numerous small deposits of pus were found in the cortical and medullary tissues. The infundibula and calices were filled with pus and a thick viscid mucus. The mucous membrane of the bladder was very vascular, and partly covered with plastic lymph. The brain and spinal cord were perfectly normal. In these patients the disease was complicated with disease of the bladder, in other cases the latter is exhibited, the pains increased, especially at night; they settled in the region of the kidneys and descended to the scrotum. A hard nodulated tumour now became perceptible in the left hypochondrium. It was very tender to the touch, not moveable, about two inches in diameter, and as gentle percussion gave a dull and more forcible percussion a clear sound, it appeared to proceed from the anterior wall of the fundus ventriculi. This tumour, which rapidly extended forwards, reaching into the scrobiculus cordis, soon became the seat of violent, lacerating, and constringing pains, which occurred at the same time with those shooting from the back, and often terminated with extreme anxiety, dyspnœa, and general perspiration. The difficulty of walking increased, because every firm step induced fresh attacks of pain in both hypochondria. From the commencement of August, 1843, the pains and the gradual increase of debility confined the patient to his bed, and rendered the slightest movement of the trunk almost impossible. The pains in the tumour of the testicle had increased. On the 16th of August the patient complained that since midnight he had experienced creeping and formication in his feet, which had gradually ascended, and that his legs now felt as if they had gone to sleep. Sensation was lessened in the lower extremities; he was able to move them, but with difficulty. In the evening the legs had entirely lost their sensibility and motility; the anæsthesia extended over the abdominal parietes to the tumour and the false ribs. The temperature was not reduced, and was maintained to the last moment. The pain which had hitherto tortured the patient ceased from this time; except that movement of the trunk, deep inspiration, and pressure, induced it in a slight degree in the region of the stomach. Shortly before the paralysis supervened vomiting had occurred, which returned once or twice daily, after being preceded by nausea. The appetite disappeared, while thirst and dryness of the mouth and œsophagus increased. The excrements were voided involuntarily, and the urine had to be drawn off several times daily by the catheter. The feet became œdematous. The intellect remained unclouded. The voice became faint and hoarse, respiration slow, often intermittent, and during the last two days the expectoration was bloody. A few times formication occurred in the arms. Death resulted from pulmonary

---

[1] Magazin für die gesammte Thierheilkunde, herausgegeben von Gurlt und Hertwig, vol. iii, p. 355.

[2] Loc. cit., vol. ii, p. 108; and vol. iv, p. 435.

[3] On Irritation of the Spinal Cord, and its Nerves in connection with disease in the Kidneys, Medico-Chir. Transact., 1833, vol. xviii, p. 260.—See also Bright's Medical Reports, vol. ii, pt. i, p. 380.

[illegible]

[illegible] lumbar vertebrae. The vertebrae [illegible] were [illegible] in structure. The bodies of the five lumbar vertebrae were then removed by the aid of a chisel and the spinal cord exposed, but with the exception of a trifling congestion of the [illegible] nothing abnormal was discovered. The following is the account of the appearance of the testicle and epididymis. The testicle, on being cut through, showed no trace of its original structure, and appeared as a tolerably dense mass, which in some parts presented a yellowish and fatty, in others a sanguineous and reddish texture; it felt uniformly soft and not granular; under the microscope it was seen to consist of irregularly-shaped cells with granular contents, surrounded by fat globules and minute granular molecules, but without caudate cells. The entire mass weighed about fourteen ounces. The tumour in the abdomen had all the characters of genuine encephaloid disease; it felt soft, and on incision melted down to a light red soft mass, feeling like fat; under the microscope it exhibited the same irregular cells and nuclei, as found in the testicle, and a cellular tissue constituting the stroma of the morbid growth.

I have myself had a man under my hands for a considerable time, whose disease commenced with hæmaturia, upon which subsequently a sense of oppression, weakness in the inferior extremities, and a violent lacerating pain in the thoracic and lumbar vertebræ supervened, which was not increased by external contact. During the last three weeks complete paraplegia had become developed, accompanied by paralysis of the bladder; sopor, delirium, and convulsions, which also involved the paralysed limbs, followed, and terminated in death. Professor Schlemm had the kindness to examine the brain and spinal cord; with the exception of an incrustation of a few cerebral arteries and an accumulation of serous fluid in the ventricles, no abnormity whatever was discovered; nor were the membranes or the osseous envelopes any way affected. The left ventricle of the heart was hypertrophied. Unfortunately the kidneys were overlooked, as I was unable to wait till the conclusion of the post-mortem.

Finally, I may be allowed to adduce the results of treatment in support of the doctrine of a connection existing between diseases of the urinary organs and paraplegia. In a case of dysuria, stricture of the urethra, and paraplegia, published by Dr. Graves,[1] manifest improvement followed the first introduction of a bougie; the cure was achieved by warm baths, frictions, &c. The praise bestowed upon cantharides, the ethereal oil of turpentine, and Peruvian balsam, as remedies

---

[1] A System of Clinical Medicine, p. 408.

[illegible] affections [illegible] with some justice [illegible]

[illegible] *Affections of* [illegible] ... [illegible] peculiar opportunities [illegible] connected with morbid [illegible] ... either from direct [illegible] upon the nervous [illegible] ... unilateral and [illegible] sensibility [illegible] pain, numbness [illegible] caused by a reflex influence [illegible] both sides of the body. [illegible] ... with the complication [illegible] quotes eleven cases of [illegible] followed calving [illegible] was diminished, while sensibility [illegible] paralysis the second calving [illegible] following calving [illegible] and vagina. [illegible] in horses, which [illegible] and to raise themselves [illegible] observed similar occurrences

[illegible] a woman, aged 33, applied [illegible] been delivered of her first [illegible] twelve hours. [illegible] left leg and on the following [illegible] of anæsthesia, difficulty in [illegible] foot. The examination showed that [illegible] for that it was dependent on [illegible] patient could not distinctly feel [illegible] when she put down her foot. The [illegible] dragging of the leg in walking. [illegible] after delivery. The veins were [illegible] A purgative was [illegible] and the internal exhibition of [illegible] commencing with half a grain, and increased to [illegible] The result was so completely satisfactory, that the [illegible] and on the 3d of March the patient [illegible]

[illegible]

[illegible] Zeitschrift für die gesammte Thierheilkunde, vol. iii.

[illegible]

in women. Lisfranc[1] details the case of a lady, aged 36, who had gradually been attacked with paraplegia, without any loss of sensibility. All the remedies applied on the assumption of a disease of the spinal cord, remained unavailing. Lisfranc made a vaginal examination, and found the fundus uteri so much enlarged as almost to fill the pelvis; after using the iodide of potassium and iodine frictions for three months, and taking the waters at Barège, the tumefaction of the uterus was reduced, and complete recovery was obtained in two years. Paralysis of the lower extremities often supervenes during the confinement, and even after easy births, without pain having preceded or being associated with it; and the accoucheurs attribute it to compression of the sciatic plexus and the obturator nerve, for which there is no warrant whatever. There would be more justice in assuming that an accumulation of serous fluid had taken place in the spinal canal, resulting from disturbance of the circulation, as we find in tumours of the abdominal cavity; but morbid anatomy does not afford any proofs of the fact. No such condition, however, is necessary as demonstrated by a case which recently came to my notice, and in which the uterus was atrophied. A woman, aged 41, had since the cessation of her catamenia, six years previously, frequently suffered from twitchings of the inferior extremities, and for nine months past motility had been diminished; there was a frequent tremor and sense of weight in the legs. The cutaneous sense of touch was dull in the feet, especially in the left, in which the disease had commenced with lacerating pains. Retention of urine alternated with enuresis, especially at night. The upper extremities continued in the full possession of their vigour. No abnormity was discoverable in the spinal cord. Dr. Schöller, whose accurate method of exploration is well known, found that the vagina was much shortened and that there was no portio vaginalis; only the transverse fissure of the uterus remained visible at the arch of the vagina directed from before backwards. The os tincæ was very soft, and the neck presented the usual hardness; it was evident that the sexual system had undergone a process of involution, as in an old woman. I ordered the alkaloid of the nux vomica, strychnine, in doses of a quarter of a grain twice a day, and frictions of the spine with the ethereal oil of turpentine; after continuing this treatment for three weeks a favourable effect was experienced. The difficulty of micturition ceased, and a remarkable improvement in the gait was manifested. The same effects of the strychnine rendered it necessary to omit it for a time. The patient still continues under treatment.

---

[1] Journal de l'Anatomie, de la Physiologie, et de la Pathologie du Système Nerveux; Paris, 1843, vol. i, p. 154.

The hysterical form of paralysis belongs to the present chapter. In the description of hysteria, which is a reflex neurosis proceeding from the genital system, I have pointed out that the paroxysms are characterised not only by the sudden transitions of the convulsions, with regard both to their seat and degree, but also by the instantaneous exchange of one condition for that diametrically opposite; thus we see an excess of mobility and sensibility pass rapidly into immobility and obtuseness, and profuse discharges replaced by an arrest of secretion. This reflex inactivity and the paralytic symptoms by which it is marked, are either of an evanescent character, or they are periodical or persistent. In the first case, the paralysis is manifested during or after the attack, and may assume the various forms of paraplegia, hemiplegia, paralysis of single parts, as the hand, the foot, the larynx, or the bladder; the same form may persist or the affection may present various phases, and be accompanied with numbness, anæsthesia, and formication; the attack itself is of brief duration. This variety of paralysis closely resembles that occurring after epileptic paroxysms, (page 201.) On account of its periodical character it is allied to intermittent paralysis, a disease of such rare occurrence, that I am induced to quote the following instance:

In the month of April in 1830, I was called to a lady, aged 64, who, after having been in good health on the previous day, was suddenly attacked with paralysis of the lower extremities, with an involuntary discharge of urine and fæces. When lifted out of bed she was unable either to stand alone or to walk even a few steps, but instantly sank down. Sensibility was unimpaired, the intellect was clear, the temperature of the skin cool, the pulse 80, small and empty, breathing normal. She uttered no complaint of pain in the spine. Being unable to ascertain any definite cause to which the malady could be attributed, I ordered the application of sixteen cupping-glasses along the vertebral column, a blister in the lumbar region, and internally an infusion of arnica, with the liq. ammoniæ vinosus;[1] at the same time I did not conceal my apprehensions from the relatives, that I anticipated a fatal issue. I was surprised by the great alteration which I found on the following day; the patient came to meet me, led by her daughter, still complaining of weakness in the legs, and able to discharge her urine at will. She had not as yet had an evacuation from the bowels. The morning after, however, entirely clouded my joy at the sudden efficacy of the remedies employed; all the symptoms had recurred that alarmed me two days previously; the character of the paralysis was now clearly manifested, and the prevalence of intermittent fevers at the time helped to confirm the diagnosis. To avoid all error I determined to await the third paroxysm, and it did not fail to take place at the proper time, though this time unaccompanied by paralysis of the sphincters of the bladder or rectum. I now ordered three grains of the sulphate of quina to be taken every two hours; and after the intermission of two paroxysms, bark in substance was exhibited for several weeks. I have since attended the same lady for another affection, and she has not suffered again from debility of the legs, or from any other paralytic affection.

In some cases the hysterical paralysis is persistent, serving in a measure as a substitute for the other symptoms of the disease, which cease during its continuance. The peculiar psychical relations are as remarkable in this as in other hysterical affections; there is irresolution, amounting at times to an utter prostration of the powers of the will, and an inability to offer any moral resistance; the patient yields to and is overcome by every impression. This trait is so characteristic, that an accurate observer[2] has been induced to assert that, in hysterical paralysis, the muscles are not incompetent to follow the impulse of the will, but that they are merely immoveable from the will not being exercised. There is no other paralytic affection upon which psychical impressions, as faith and superstition, joy or fear, exert so marked an influence. But a favorable change may occur suddenly and spontaneously, as is often the case in hysterical affections, and this is attributed inconsiderately to agents possessing no power, such as homœopathic remedies. The prognosis of this affection is satisfactory both to the patient and the physician; even if it lasts a considerable time, nutrition does not suffer, and the sphincters continue in the possession of their functions. This must not be forgotten in the treatment; violent and energetic treatment (such as moxæ or issues) should be avoided. As regards the moral treatment, I refer to what has been stated at page 90. The peripheral nerves should be roused by friction, by stimulant and aromatic infusions injected into the vagina, suppositories of castoreum, &c. The preparations of nux vomica are as well suited to hysterical as to other forms of paralysis. The warm baths of Ems, taken at the temperature suited to the irritability of the individual, together with the vaginal douche, are much to be recommended. I have had an hysterical lady under my care, who, after having been paraplegic for a year and a half, was in a short time restored to health at Ems by the excellent management of the late Dr. Diel. In an anæmic condition, chalybeate baths are indicated; Dr. Brück[1] found the waters of Driburg more efficacious in hysterical paralysis of the lower extremities, than in any other symptom of hysteria.

---

[1] [Liquor ammoniæ vinosus is composed of one part of liquor ammoniæ to two parts of spiritus vini rectificatissimus.]—ED.

[2] Brodie; Lectures illustrative of certain Local Nervous Affections, p. 48.

---

[1] See the admirable Treatise by Dr. Brück; Das Bad Driburg in seinen Heilwirkungen dargestellt, 1844, p. 94.—Brandis; Erfahrungen über die Wirkung der Eisenmittel im Allgemeinen und des Driburger Wassers insbesondere, 1803, pp. 150—172. And—Lentin's Geschichte der Eisengranulirbäderm Harze, in dessen Beiträgen zur ausübenden Arzneiwissenschaft, vol. i, 2d ed., p. 71.

[Driburg is a small watering-place in Westphalia; the principal constituents of its waters are salts of soda, lime, and iron.]—Ed.

CHAPTER XLIX.

TABES DORSALIS.

The spinal cord viewed as a central organ, not only serves as an agent for the mutual transmission of stimuli, but also as a source of nervous power, of the principle of motor and sensory tension, by which the continuance and vigour of motion and sensation is secured, and a general stimulus for the entire organism provided. The disease, which is characterised by a diminution of this power, is termed tabes dorsalis.

The first symptom by which it is manifested is reduction of the motor power in the muscles, first and foremost in the inferior extremities; at the commencement one leg may be affected more than the other, but in the progress of the disease both suffer. The patient complains of weakness and inability to perform any movement or endure any position for a continuance. If he is required to attempt any act demanding a larger consumption of motor power, *e. g.* to bend down or to stand on one foot, his strength at once fails; the practised rider is unable to hold on to his horse as long as usual. Early in the disease we find the sense of touch and the muscular sense diminished, while the sensibility of the skin is unaltered in reference to temperature and painful impressions. The feet feel numbed in standing, walking, or lying down, and the patient has the sensation as if they were covered with a fur; the resistance of the ground is not felt as usual, its cohesion seems diminished, and the patient has a sensation as if the sole of his foot were in contact with wool, soft sand, or a bladder filled with water. The rider no longer feels the resistance of the stirrup, and has the strap put up a hole or two. The gait begins to be insecure, and the patient attempts to improve it by making a greater effort of the will; as he does not feel the tread to be firm, he puts down his heels with greater force. From the commencement of the disease the individual keeps his eyes on his feet to prevent his movements from becoming still more unsteady. If he is ordered to close his eyes while in the erect posture, he at once commences to totter and swing from side to side; the insecurity of his gait also exhibits itself more in the dark. It is now ten years since I pointed out this pathognomonic sign, and it is a symptom which I have not observed in other paralyses, nor in uncomplicated amaurosis; since then I have found it in a considerable number of patients, from far and near, who have applied for my advice; in no case have I found it wanting. Some patients mention the circumstance without being asked about it; one gentleman, a foreigner, whose eyesight was unimpaired. told me that he was at present unable to wash himself in his dark bedroom while standing; and that if he wished to keep his balance he was obliged to have a light while performing his toilet. Another, whose business rendered it necessary for him to go out at six o'clock in the morning, complained that he required some one to support him in the house and out of doors, but that he could dispense with assistance in full daylight.

Independently of this peculiarity, there is also a difference in the movements themselves; the patient experiences a greater difficulty in executing forced and limited movements, than those in which he merely follows the impulse of his inclinations; he finds it much more laborious to walk slowly with a measured step in a given direction, than to let his feet take their own course; rising from the chair, or going up stairs, is more difficult than sitting down or descending; the most difficult matter is to turn round in walking. After prolonged rest, walking and standing are more laborious and insecure than when once begun. The loss of muscular power is also manifested in organs provided with a sphincter, and especially in the bladder. At the commencement of the disease, the desire to micturate occurs more frequently, and cannot be gratified soon enough, for the patient is unable to retain his urine till the utensil is brought to him. Enuresis not unfrequently occurs during sleep. The urine is not discharged in an arched jet, as in health, but falls more perpendicularly; nor is the bladder entirely emptied. Costiveness prevails almost universally; the patient feels that he is unable to strain as long and as forcibly as before. Painful sensations of different kinds almost invariably accompany the affection; the most common is a sense of constriction, which proceeds from the dorsal or lumbar vertebræ, encircles the trunk like a hoop, and not unfrequently renders breathing laborious. Several of my patients have described this sensation as particularly troublesome during sleep, causing them suddenly to start up and scream out. Others complain of a heavy weight pressing upon the rectum and the bladder, others again of colic and gastric pains; the majority suffer from pain shooting through the legs, and a sense of pricking, itching, burning, or cold in the skin of the lower as well as of the upper extremities; the face alone is an exception. Formication very rarely occurs in the back. These symptoms may endure for a considerable time, and at first they attract little attention. After an uncertain period the weakness of the legs diminishes visibly. The patient, owing to the threatening loss of balance, is obliged to evert his feet, and walk with his legs apart; he leaves his heels as long as possible in contact with the ground, and keeps his knees bent; he is still able to propel himself, (one of my patients stated to me, that he found it necessary to think of every one of his movements,) and to totter along the streets, but if arrested in his progress, he is unable to stand still without clinging to some support. The patient's own strength soon fails to support him, and he is obliged to have recourse to assistance. The necessity of employing his eyes becomes more and more urgent; if he closes his eyes, even while sitting, his body begins to sway to and fro; in one case the patient was unable to maintain himself erect in his chair, and slid down to the ground; when in an horizontal posture, the patient is no longer able to recognise the position of his own limbs, and cannot tell whether the right leg is crossed over the left or the reverse. A foreigner, who was a patient of mine, told me that in visiting the diorama he had not the slightest sensation of his progression when led from the light to the dark department. The condition of these unfortunate individuals is rendered the more distressing by the circumstances that amblyopia often supervenes; in many cases it is associated with the disease from the commencement. Even when the optic nerve was not implicated, I have repeatedly found a change in the pupils of one or both eyes, consisting in a contraction with loss of motion, which in one case, that of a man aged 45, attained to such a height that the pupils were reduced to the size of a pin's head. In one case, where there was no cerebral affection, a strabismus towards the inner angle took place, the patient at the same time being able to move his eye outwards at will. As the disease progresses, the loss of power also extends to the superior extremities, though they are not affected to the same degree as the inferior. The sphincter of the bladder becomes completely paralysed; erections cease, and the virile power becomes extinct. The intellect of these patients generally remains unimpaired; the majority do not complain much, and they are inclined to represent their condition, especially to the medical man, in a too favorable light; if they are members of the higher classes, they anxiously endeavour to conceal their loss of motor power, in order to avoid the evil reputation of being affected with tabes dorsalis. Nutrition is not impaired in a measure corresponding to the diminution of motor and sensory power. Such patients may even retain their embonpoint for a considerable time, so that the term tabes does not apply to this feature. At a later period the muscles become flaccid and atrophied, especially about the nates, the legs, and the back. Towards the termination of the disease the patient becomes utterly incapable of holding himself erect or moving; still he continues able to execute movements with his feet at will when the trunk is supported. Diuresis alternates with ischuria; the fæces pass off involuntarily. Gangrene at the sacrum and trochanters, accompanied by febricitations, ushers in death.

Tabes dorsalis is a chronic disease, which may extend over several—as many as ten and fifteen—years. It is only shortened by complication with other more rapidly fatal diseases, especially pulmonary and intestinal phthisis. Intercurrent diseases may also accelerate its progress.

Although the post-mortem records of this disease may present considerable variations, they almost without exception show the existence of partial atrophy of the spinal cord; the lumbar portion and the nerves given off from it are the parts generally affected. The loss of substance, which may amount to one half or two thirds of the healthy spinal cord, either affects the grey and the white substance, or only one of them. It would be well always to have a fresh, healthy specimen at hand for the sake of comparison, and to render the examination more satisfactory. As yet we possess no microscopic investigation of the atrophied portion. The contents of the cords of the cauda equina have often been found to have disappeared to such an extent that nothing but the empty nurilemmatous sheaths seemed to remain. The roots of nerves inserted at a higher segment of the cord also suffer from atrophy; and it is a point of especial interest to observe that the posterior, sensory roots, are occasionally alone affected in conjunction with the posterior columns of the spinal cord, the anterior motor columns and nerves retaining their normal structure. A remarkable instance of this occurred to me in the person of a medical practitioner of a provincial town, of 52 years of age; after violent emotions and severe colds, caught in the prosecution of his profession, he had in his fortieth year been attacked with partial paralysis of the lower extremities and amblyopia, for which, at the suggestion of myself and the late Professor Rust, he went through a course of the Marienbad waters, but to no purpose; the amblyopia passed into complete amaurosis, and tabes dorsalis became fully developed in spite of all the remedies employed. I did not see the patient again; but I ascertained that the insensibility of the skin was maintained to the last and that he correctly appreciated variations of temperature. I was present at the post-mortem examination which was made by Professor Froriep, and the spinal cord, compared with the fresh cord of a man of the same age, only amounted to two thirds of its normal size; I was not a little surprised to find that the atrophy was confined to the lower part of the posterior columns and nerves. The medullary tissue of the former had almost entirely disappeared, so that they were translucent, and of a greyish-yellow colour. The posterior roots of the nerves were deprived of their nerve matter, and presented a watery appearance. From the middle of the dorsal nerves upwards, the atrophy passed into a healthy condition. The anterior columns and roots of the nerves presented no abnormity. Froriep has observed the same in another case of tabes dorsalis. When the disease has been accompanied by amaurosis, we almost invariably find the optic nerve, the chiasma, and the optic tracts atrophied; one or both optic thalami are also either atrophied, or they exhibit changes of texture and colour. The other morbid changes found in tabes dorsalis vary; sometimes the white substance presents a coriaceous condensation, but it is more usual to find softening of the grey matter. In 1832, I examined a man, aged 42, who had been under my care for three years for tabes dorsalis, and found the lumbar, the cervical, and a portion of the dorsal region of the cord of an almost fluid consistency; it was traversed by a number of white longitudinal fibres, as if a delicate cauda equina passed through the cord. The meninges rarely retain their healthy condition; the arachnoid is thickened and beset with cartilaginous and osseous plates, and contains more or less serum. It is exceptional to meet with morbid changes in the osseous envelopes.

Two circumstances that have been shown with certainty to predispose to tabes dorsalis are the male sex and the period between the thirtieth and fiftieth year of life. Scarcely one eighth of the cases are females. The loss of semem has always been looked upon as one of the most fruitful sources of the complaint; but this in itself does not appear to be a matter of much consequence as influencing the disease, as patients who have been labouring under spermatorrhœa for a series of years, are much more liable to hypochondriasis and cerebral affection than to tabes dorsalis; but when combined with hyperstimulation of the nerves to which sensual abuses give rise, it not unfrequently favours the origin and encourages the development of the disease after it has commenced. When the strength is much taxed by continued standing in a bent posture, by forced marches, and the catarrhal influences of wet bivouacs, followed by drunkenness and debauchery, as is so often the case in campaigns, the malady is rife; this is the reason why tabes dorsalis was so frequent during the first decennia following the great wars of the present century. Rheumatism appears to be the morbid process which most frequently gives rise to it. The cases are not rare in which the most careful examination fails to establish an exciting cause.

There is no prospect of recovery for patients of this class; the fatal issue is unavoidable; the only consolation that can be offered to those fond of existence is the long continuance of the disease. If in any case the busy activity of the physician increases the sufferings of the patient, it is in tabes dorsalis. When one of these unfortunate individuals presents himself to us, we generally find his back seamed with cicatrices, he brings us a heap of prescriptions, and gives a long list of the watering-places he has visited in search of health. It is but common humanity to inform him at once that therapeutic interference can only injure, and that nothing but the regulation of his diet can retard the calamitous issue. Every unnecessary tax made upon the motor powers, as well as sexual excitement, ought to be strictly prohibited. The best remedy for the obstinate costiveness is to be found in cold water enemata; the careful use of cold water in washing the trunk and spinal cord, and in the shape of affusion to the latter, may be recommended. I have employed an ointment containing veratrine with benefit against the painful sensations in the back and extremities. The thing most to be avoided is the frequent application of cupping and issues; nor are long journeys to watering-places advisable, because the driving itself is injurious, and the baths will only afford temporary relief, which will disappear on the return of the patient. Incurable patients should be allowed to spend their lives quietly in their family circle, that their last moments may be soothed by the fond cares of those whom they love.

CHAPTER L.

CEREBRAL PARALYSES.

In no other department of neuropathology is the absence of critical judgment so much felt as in the doctrine of cerebral affections; nor have unfounded opinions, errors, and even falsehoods anywhere met with so facile a reception as in this case. When we turn to the study of paralysis depending upon the brain, we find all the authors committing the same error in not distinguishing between the nerve fibres that pass off at the brain, and those which terminate within it. The former only form the first stage of the peripheral tract, and are without exception subject to the law of conduction on the same side; this has been overlooked, and the consequence has been that all diseases occurring within the cranium have been looked upon as affecting the brain as a central organ; this accounts for the uncertainty which prevails even among physiologists regarding the decussation or non-decussation of cerebral conduction. But these states are of sufficient importance in point of diagnosis and therapeutics, to merit a separate consideration, though they have often been cursorily alluded to in the preceding chapters. In addition to the physiological criterium of loss of the conducting power on the side of the injury, the paralysis of the nerves adjoining the brain and within the brain may be distinguished by the relations of time and situation. If in the former case the seat of the injury is limited, we shall find single cerebral nerves affected and generally throughout their distribution; or if the injury is more extensive, the adjoining nerves are involved according to their contiguity from before or from behind, and either temporarily or permanently. In the majority of instances this takes place in a regular succession, slowly in the case of tumours, or more rapidly when exudation or hæmorrhage has occurred. To central paralysis on the other hand we may apply the physiological law of conduction in a crucial direction, and it is diagnosed by the coexistent affection of other nerves, both sensory and motor; not only the nerves of the head, but also those of the tongue and the extremities, lose their power of conduction. It is also a characteristic circumstance that the nerve is rarely entirely affected; some of its fibres generally remain exempt from the paralysis.

The exciting causes generally act by inducing compression, with or without irritation. The cranial bones at the basis of the brain and the periosteum are frequently at fault; the latter has not hitherto met with the attention it deserved, although the periostitis of the surface, which is more accessible, might have served to direct attention to the subject. It is here that the dyscrasiæ take root, as we see in syphilitic, mercurial, scrofulous and rheumatic cachexiæ; the gouty diathesis rarely manifests itself in this quarter. In these cases the paralysis is accompanied by the symptoms peculiar to the constitutional affection, as for instance in syphilitic nodes, the agonising pains that torture the patient at night. The recovery of the patient depends more upon the correct diagnosis in this than in any other kind of paralysis; and it is dangerous to confound these forms with apoplectic conditions of a central origin. The specific remedies, mercury and iodide of potassium, prove invaluable in these cases, but we must be careful not to continue their use too long. The Decoctum Zittmanni may be appropriately exhibited here. Among several cases of the kind which I have among my notes, I may quote the last, which occurred in a man upwards of 50 years of age, who after suffering repeatedly from chancres of the glans penis, began in April 1844 to complain of loss of sensation in the right upper lip, which gradually extended over the corresponding half of the chin, the right cheek, ear, and forehead. The right half of the tongue and the mucous membrane of the mouth also became affected with anæsthesia; the teeth on the same side felt as if invested with a thick mucous covering. The power of mastication ceased on the right side. Strabismus internus ensued; the patient was unable to move the right eye outwards. Ptosis and immobility of the right pupil followed next. Four weeks after the commencement of the disease, the right half of the face became the seat of pain, which increased in violence towards evening, and attained such a pitch that the patient could not sleep for 65 nights. Great emaciation and debility ensued. All the remedies employed were fruitless; the only thing that afforded even momentary relief was washing and pouring water over the head and face. In the month of

July the patient applied to me for advice; I did not agree with the view taken by other medical men as to the affection being central and incurable; but believing the disease to be syphilitic periostitis of the sphenoid bone, I recommended a course of mercurial inunction and starvation, which the patient commenced on his return home and continued for four weeks. Salivation did not occur. The pains were diminished to such an extent that the patient again enjoyed as sound sleep as he had in former days. In September the ptosis yielded. In January I again saw the patient and presented him to the gentlemen who attended my clinical lectures. The local symptoms as well as the general health of the patient were already much improved. The ptosis had entirely disappeared; the abducens had, though not entirely, recovered its conducting power, the pupil contracted normally, and only the fifth nerve continued affected. Sensation had returned in the lower part of the right half of the face; the remaining parts continued numbed, and there was still a variety of abnormal sensations, such as pricking, formication, itching, and tension. Though the face was insensible to the touch, it was very sensitive to heat and cold; in drinking a hot beverage the patient experienced a burning sensation not only in the upper lip, but also in the forehead. Although the surface of the eye exhibited little sensibility, when water of a temperature of 14° F. (—8° R. in orig.)[1] was applied, the eye seemed to be frozen. The muscles of mastication had not regained their functions. I was able to hold out a prospect of further amelioration to the patient from the internal and external administration of iodide of potassium and a future repetition of the course of mercurial inunction.

Morbid growths at the base of the brain and cranium frequently arrest the conduction of the nerves that pass off from there. They are generally tumours of a scirrhous and carcinomatous, rarely of a tubercular character; they more frequently occupy the anterior than the posterior part of the cranium, and owing to their indolent growth give rise to a slow succession of paralytic phenomena in the range of the adjoining nerves. Bell has given an instance which may serve as a model of clinical observation, and which has been rendered

---

[[1] The context renders it probable that this is a misprint for 80° R., or 46° F.]—Ed.

still more instructive in the last edition by the publication of the post-mortem.[1] The patient was wounded in the battle of Waterloo on his left temporal and zygomatic bone; five years later he received a kick from a horse on the same part. The following symptoms presented themselves successively: violent pain in the left cheek and forehead; ptosis of the left eyelid, and rigidity of the bulb and strabismus externus; next the bulb assumed a central position, and remained immoveable even when the eye was closed, and in winking, the left pupil became dilated and immoveable, the left half of the face anæsthetic, accompanied by agonising pain; masticatory paralysis of the same side and atrophy of the masseter and temporal muscle, histrionic paralysis of the left side, destructive inflammation of the eye, and ulceration of the cornea ensued. After a few months the facial paralysis ceased, while the painful anæsthesia continued until death. At the autopsy a considerable difference was found in the masseters of the two sides; the left temporal and masseter were pale, thin, and deprived of a large portion of their fibres, while the corresponding muscles of the opposite side presented double the size and a red colour. On raising the brain, adhesions of an older date were found at the left side of the sella turcica, between the dura mater and the membranes of the brain, which at this point presented a reddened appearance. On separating the adhesions, a tumour was exposed on the side of the sella turcica, over which the dura mater was stretched. The tumour thus occupied the entire cavernous sinus. It had a cheesy character, though its density was rather greater on account of an admixture of fibrous tissue. There was no difficulty in detaching the tumour from the bone, which was perfectly healthy in other respects, with the handle of the scalpel. The oculomotor, trochlear, trigeminus, and abducens nerves, were imbedded in the substance of the tumour. All these nerves between their origin from the brain and the tumour were of a pale grey colour, and were perceptibly diminished in size. The optic crossed the upper part of the tumour and also presented a dull grey colour, while the left optic was of a pearly white hue. In this case the oculomotor was the nerve first affected by the tumour, and owing to the integrity of the abducens the eye squinted outwards; when this nerve had also suffered from the compression, and all the ocular muscles had become paralysed, the bulb was rigidly fixed, and remained immoveable in the centre of the orbit. The temporary paralysis of the facial nerve showed, as was afterwards evidenced by the adhesions, that the inflammation had at one time extended to the origin of this nerve, but without affecting it permanently.

---

[1] The Nervous System, 3d ed., p. 264.

Among the tumours comprising the nerves at the base of the brain, we have also to mention aneurisms, a few instances of which have already been communicated.

In all these cases the succession of the paralytic symptoms is slow; they occur in rapid succession or even simultaneously, when sero-albuminous accumulations take place at the base of the brain. In meningitis we frequently have opportunities of seeing this; the extension of the paralysis affords a measure to determine the locality of the inflammation and exudation, which is most frequently found in the pentagonal space between the optic chiasma and the pons Varolii, beneath the arachnoid. If absorption takes place, then paralytic affections gradually cease, but not always in the order of contiguity.

Besides the morbid changes at the base of the brain, by which the nerves traversing it are deprived of their conducting power, there are also diseases of the central organ itself, which affect the nerves at their point of insertion into the medulla oblongata and brain, and consequently produce peripheral paralysis in addition to the phenomena of a cerebral affection. These cases are extremely difficult of recognition, and are generally interpreted erroneously. Thus Dr. Watson[1] met with a case in which there was complete facial paralysis with deafness on the right side, and the patient also suffered from headache, vertigo, a tottering gait, drowsiness, and delirium. A few days before death, sopor and contraction of both arms supervened. In the right hemisphere of the cerebrum there was a considerable tumour, of three inches in length by two broad, which exerted so much pressure as to cause the parietes of the right lateral ventricle to be in apposition. The right facial and acoustic nerves at the point where they leave the medulla oblongata, adhered to one another; the facial was harder and thicker than its fellow, the acoustic was soft, diffluent, and atrophic; immediately above the medulla oblongata, and in a line vertical to the insertion of the facial, a nipple-shaped process descended from the lower surface of the cerebrum, which compressed the two nerves, and appeared to have been formed in consequence of the pressure exerted by the large tumour.

---

[1] Bell, The Nervous System of the Human Body, 3d ed., 1845, p. 304.

We find that tumours of the pons Varolii are peculiarly liable, not only to compress the nerves passing from and near it, but also to involve the adjoining medulla oblongata, and thus to induce paralysis of the extremities in a crucial direction. This peculiar combination of the paralytic symptoms in the facial nerves on the one hand, and of the nerves of the extremities on the other, allows our determining the seat of disease with some certainty during life. The following case, which has fallen under my observation, may serve as an illustration: Mr. B., a Pole, and student of philosophy, 23 years of age, and according to the statement of his friends always of weak mental powers, had become still more obtuse after a nervous fever which he had laboured under in January, 1840. In the middle of August, 1840, I was called to see him, and found that three weeks previously he had taken too much wine at a supper party, and in his intoxication had caught cold at the river side. On the following morning he felt a great weakness in the left arm and leg, and on looking at himself in the looking-glass, found that the right eye was turned towards the nose, and that he was unable to turn it outwards. His speech was hesitating. He hoped to get better by taking violent exercise, and by fatigue, and he tried to remove the clumsiness in walking by long promenades, but his condition was only rendered worse. I found that the sensory as well as the motor conducting power was diminished in the right half of the face and in the extremities of the left side. The right half of the forehead was only thrown into shallow folds as compared with the right; the right bulb was directed towards the nose, and the strongest effort of the will failed to turn it outwards, even when the left eye was closed. The strabismus was accompanied by double vision. The pupil was of normal size, and equally moveable with the one of the left eye. Vision was unimpaired; the eye of this side could be well opened, but not so firmly closed as the left; a fissure remained when the attempt was made. The sensibility of the right half of the face, though not extinguished, was obtuse. The patient himself observed that he felt the pricking of the skin on this side but faintly, while pricking the left cheek induced pain. This difference was scarcely perceptible in the nares, the sense of smell continuing unimpaired; nor was there any difference in the two sides of the tongue, both sides of which tasted equally well. During the later period of the disease I have not repeated these experiments, owing to the inability of the patient to give an accurate account of his sensations. The patient heard much less distinctly with the right than the left ear. The histrionic and masticatory movements of the muscles of the right side of the face were more indolent, and the left angle of the mouth was distorted in speaking. Articulation was performed very slowly, the tongue continuing perfectly moveable in every direction. The motility of the left arm was impaired, its sensibility normal. The pressure of this hand was powerless compared with that of the right; the patient could only raise his hand and fore arm to a certain height, and any movement of the upper arm was out of the question. He dragged the left foot in walking; there was no complaint of headache, though the point was particularly inquired after. The intellectual powers were depressed, and the sleep was sound. The pulse heavy, making seventy beats. The skin dry, the bowels costive, and resisting even drastic remedies. The treatment proved of no avail. The bodily and mental powers failed more and more. During the last four weeks of life, a difficulty of deglutition supervened, which seemed to reside more on the left side, as the patient also himself stated. The torpor of the intestinal canal continued up to death, which ensued at the commencement of the month of October, 1840, preceded by profound sopor.

Previous to the autopsy, which was made by Dr. Böhm, I again, according to my custom, gave my reasons for the diagnosis which I had formed; the complication of paralysis of the left extremities, with a paralytic affection of the right side of the face, allowed me to assume a disease at the right base of the brain, involving the peripheral distribution of the nerves given off there. If the right hemisphere of the brain had been affected as a central organ, paralytic symptoms would have been manifested in the left half of the face, combined with paralysis of the left extremities; and in speaking the right angle of the mouth would have been distorted instead of the left. The phenomena presented during life suggested not only the seat of the injury, but also its extent. The anterior portion of the base of the brain was evidently uninjured as far as the fifth nerve. The olfactory, optic, oculomotor, and trochlear nerves, exhibited no derangement in their functions, for it was sufficiently evident that the direction of the bulb inwards did not depend upon spasmodic action of the oculomotor, from the inability of the patient to direct his eye outwards at will, even when the left eye was closed. From the region of the fifth the morbid changes which particularly involved the abducens evidently extended to beneath the upper portion of the medulla oblongata, as the right eye was turned inwards from the commencement, and as the left extremities were seized with paralysis. The greater difficulty was to form an opinion of the nature of the disorganisation. The symptoms showed that some cerebral nerves were more compressed than others, indicating an unequal volume, yet there were no features by which the exact nature of the disease could be determined. Neither the experience of others nor my own afforded an instance of hæmorrhage at the base of the brain, after which the patient survived for ten weeks with so extensive a residuary affection; nor could I assume the affection to consist in softening and suppuration, because, independently of their rarely occurring at the base of the brain, several of the symptoms characterising them were absent, especially pain, convulsive seizures, and alternations of remission and exacerbation. It appeared to me more probable that we had to do with a morbid growth of a fungous character, although even in this case the absence of pain was difficult to be accounted for, owing to the vicinity of sensitive portions of the brain and sensory nerves. After opening the cranium we found great congestion of the surface, and in the interior of the cerebrum; albuminous exudation between the arachnoid and pia mater, and in the vicinity of the sylvian fissure, some serum in the ventricles, while the medullary substance was of a firm consistency. At the base of the brain a large tumour was at once seen, which on removal proved to be seated in the right half of the pons Varolii; this had attained double its ordinary size, and projected beyond the anterior margin of the left half by an inch, extended posteriorly under the right olivary body, and had thus produced a considerable displacement of the different parts of the brain and the nerves. The left half of the pons and the medulla oblongata, as well as the abducens of the right side, were most altered in shape and position; the right trigeminus, the facial and acoustic nerves, had also suffered, but less.[1] In order not to damage the preparation, which I presented to the anatomical museum in Berlin, only one incision was made into the tumour of the pons Varolii, and it proved to be formed by a large coagulum, which was disposed in layers like the contents of old aneurismatic tumours.

Longet[2] has described a case closely resembling the one just detailed in its symptoms, in which the pons Varolii contained a scirrhous tumour in its left half. Similar observations have been recorded by Abercrombie and Bright.[3] The following case of an older date, for which we are indebted to Yelloly, deserves to be recorded here.[4] The patient, a man aged 36, had for a twelvemonth been subject to violent pains darting from the occiput to the forehead. On awaking one morning he found that he had double vision, and that his left eye was turned inwards; a few days after the right hand became weak and the left leg numbed. Speech was impeded and stammering, the mouth distorted, the pulse indolent, beating sixty-eight times in the minute, and weaker on the paralysed than on the healthy side. The pupil of the left eye, which was turned towards the nose, contracted on the stimulus of light. The patient retained no control over the external rectus, nor did the bulb, as is usual in strabismus, recover its proper position on closing the healthy eye. Eight days later convulsions of the entire body supervened, with loss of consciousness, and after twenty-four hours death ensued. A few hours before the fatal issue, the pupils became insensible to light, and the left bulb resumed its normal position; a circumstance justly attributed by Yelloly to the fact, that the oculomotor had now also become deprived of its functions. A tumour of the size of a hazle-nut was found attached to the left side of the pons Varolii, extending to the left pyramid and entirely covering the left abducens. It had partially commenced suppurating, and was adherent to the basilar artery, whose coats were so rotten at this part that they yielded to the touch of the probe. A small coagulum lay upon the diseased point of the artery, as in aneurisms.

---

[1] A delineation of the parts is given in Casper's Wochenschrift für die gesammte Heilkunde, 1824.

[2] Anatomie et Physiologie du Système Nerveux, vol. i, p. 448.

[3] Medico-Chirurg. Trans., vol. i, p. 183.

[4] Reports of Medical Cases, vol. ii, p. 49.

Tubercle, when deposited in the substance of the brain and at its base, and about the points of insertion of the nerves, gives rise to symptoms which it is often difficult to interpret during the patient's life. This was the case in the following observation, which Dr. Dittrich has published in the 'Prager Vierteljahrsschrift für Praktische Heilkunde.'[1] The patient, a man aged 27, had five years previously been affected with syphilitic gonorrhœa and buboes, which were cured in four months. Ten weeks previous to his admission into the clinical wards of Professor Oppolzer, on the 19th January, 1845, the disease had commenced with febricitation, a sense of oppression in the throat, and hoarseness. For five weeks there had been luscitas[2] of the left eye, accompanied by double vision and repeated headache at the temples and vertex, which was particularly violent at night. Four weeks previously he had a sensation as if his tongue were swollen; during the last fortnight dysphagia had supervened, so that he was unable to swallow solids at all, and fluids but slowly, and not without exciting cough; from this time he lost his voice, and during the last week he also complained of weakness, numbness, and formication in the left hand. When admitted he presented the following symptoms: there was slight emaciation, the skin was white, soft, and delicate, a sense of weakness prevailed throughout the body, the head was heavy, the left eye was affected with luscitas, so that the patient was unable to move it outwards. The power of vision was impaired in the photophobic eye; both pupils were of equal size, and reacted to the stimulus of the light. The left hand was weaker than the right, and was numbed and affected with formication. The sense of touch continued vivid, but the movements were less energetic than in health. The patient asserted that both his inferior extremities felt equally strong, but he dragged his left leg a little in walking. The left angle of the mouth was drawn down, the naso-labial line was indistinct, and when the patient laughed, only the right angle of the mouth was drawn up. The tongue was protruded quickly, but inclining obliquely towards the right side. There was complete aphonia. Both subclavicular regions were less resonant than in health, and there was an absence of the normal respiratory murmur. The appetite and taste were normal; a barking cough followed deglutition, which was effected with difficulty; the patient stated that the morsel stuck in his throat. The urine was alkaline. Death occurred five weeks after admission. The most characteristic symptoms during this period were the nocturnal headaches, tremors in both extremities of the left side, debility of the tongue and complete atrophy of its right half, and loss of vision of the left eye.

---

[1] 1845, vol. iv, p. 97.

[2] [Luscitas is a term applied by Beer to that species of strabismus in which the eye cannot be restored to its normal position after the healthy eye is closed.]—Ed.

Sectio cadaveris.—The lower surface of the pons Varolii, as far as the origin of the vagus and glossopharyngeus, was firmly attached to the base of the cranium by a lardaceous, semi-transparent grey mass of tubercle. A similar mass, of the size of a pea, grey, coarse and tubercular, was sunk into the substance of the posterior left half of the pons Varolii, about three lines of the surrounding tissue were softened into a pulp; the remainder of the pons also appeared more flaccid and softer. The left abducens was entirely enveloped in the tubercular mass, the left vagus was firmly bound down to the jugular foramen and atrophied. The upper portion of the spinal accessory nerve, from the point at which it deflected from the medulla oblongata towards the foramen jugulare, was treble its ordinary size, nodulated and infiltrated with a grey, lardaceous mass. A tubercle of the size of a pea, of coarse, bacony texture, was imbedded in the superficial layer of the right corpus olivare, and compressed the root of the hypoglossus and facialis; the cerebral tissue adjoining, as well as in the immediate vicinity of the root, appeared softened and broken up. A yellowish grey crude tubercle of the size of a pea was imbedded in the anterior part of the right crus cerebri near the corresponding corpus albicans; the parts round the tubercle formed a soft pulp. The right half of the chiasma and the commencement of the right optic nerve itself, as well as the optic tract to the extent of about an inch, were infiltrated with a brawny tubercular mass, about two or three lines thick, so that no trace of the optic tract was perceptible. Its commencement was atrophied and semi-transparent. The substance of the cerebrum was somewhat softened; in each lateral ventricle there were about two drachms of serum; the right was rather narrower than the left one, owing to the greater distension and tension of the right optic thalamus and corpus striatum; both the latter felt softer than their fellows, and spongy. About as much of the medullary substance surrounding these parts and the pineal gland, as would equal a walnut in size, was softened; the sectional surface was pale, yellow, and brawny. The right half of the tongue was reduced to a tough, firm, membranous flap. In the apices of the lungs there were some cretified residues of tubercle contained in cysts. The solitary glands of the small and large intestines were tumefied.

If we now turn to the paralytic affections dependent upon the brain and medulla oblongata as central organs, we find that the prevailing physiological rule is conduction in a crucial direction corresponding to the anatomical law of decussation; which in man not only affects the medulla oblongata, laterally and from before backwards, but also prevails in other essential constituents of the brain, in the cerebellum, the pons, and the peduncles.[1]

The ordinary form of cerebral paralysis is unilateral, hemiplegia, involving the face, the tongue, and the extremities. The disease rarely assumes the form of paraplegia; when it occurs it takes this shape from the commencement, and is but rarely developed successively in both halves of the body, which is not unfrequently the case in spinal paralysis. The upper extremities are more frequently paralysed than the lower, and when the two are affected simultaneously the former suffers most. In the event of a favorable issue, the paralysis is more

---

[1] See—Arnold; Bemerkungen über den Bau des Gehirns und Rückenmarkes, pp. 29, 42, 45; and Bell, on the Functions of the Brain, in the 3d edition of his work, pp. 218, 225.

[illegible]

[illegible] of the face. [illegible] are often complicated [illegible] is accompanied [illegible] In many [illegible] a precursor of para- [illegible] of numbness, going to sleep [illegible]

[illegible]

with formication, and a sense of chilliness, a long time before the attack. In cerebral more frequently than in spinal paralysis, the sensibility is unaffected; in other cases it is exalted, and pain manifests itself in the paralysed parts, especially when the muscles are contracted.

The function of nutrition suffers to a greater or less extent, and more or less rapidly in the paralysed parts in cerebral paralysis, in proportion to the degree and duration of the muscular inactivity. The atrophy of the thin and soft parts is greatest in congenital paralysis; paralysed limbs whose muscles are contracted become more rapidly emaciated than where the muscles are flaccid. I have not seen atrophy extend to the tongue in cerebral paralysis, although it occurs in peripheral affections. In hemiplegia of long standing I have found the nutrition of the horny tissues abnormal; the epidermis becomes dry, rough, laminated; the nails, especially those of the fingers, are elevated, ragged, and brittle. In a few tedious cases I have met with œdema of the paralysed limbs. We do not as yet possess a sufficient number of observations to determine the changes of temperature that take place. Several of my patients complained of a sense of cold, some of a burning heat, without any physical diminution or increase of the temperature. The debility, irregularity, and even arrest of the pulse in the paralysed arm, observed by some older authors, has not hitherto occurred to me as a result of cerebral paralysis; in many cases it is probable that obliteration, rigidity, and ossification of the arteries have been overlooked in aged paralytic individuals.

In addition to the peculiarities hitherto described, there is one criterion of cerebral paralysis, which is based upon the physiological endowment of the brain as a central organ, viz., the power of communicating its conditions. The intellect in its totality or in some of its manifestations becomes impaired, and this state is accurately reflected in the corporeal symbols of the mind, speech, physiognomy, and the play of the features. Not only does the articulation become slow and hesitating, but the individual more or less loses the faculty of conveying his impressions in the definite form of language. The features become expressionless and flaccid. Absence of mind, forgetfulness, unconnected thought, want of resolution and determination, indolence and effeminate weeping upon the slightest inducement, are the symptoms

[illegible]

[illegible] the brain. [illegible]

[illegible] more frequently [illegible]

[illegible] according to [illegible] in [illegible] of the [illegible]

[illegible] portions of the brain [illegible] the [illegible] influence of the motor power. [illegible] authors have generally agreed with a want of due criticism, and have drawn hasty conclusions from imperfect post-mortem examinations. The results are the less to be relied upon as the disorganisation which induces the paralysis is very often associated with other morbid conditions of the brain. The turgescence of the cerebrum which is enclosed in an unyielding bony case, to which I have already drawn attention, plays the more important part in the present case as its influence extends to the healthy hemisphere also. Andral[1] relates a case in which the left hemisphere, which was the seat of extensive softening, was so much swollen, that the mesian fissure no longer occupied the middle line, but was pushed over to the right. In one patient, a female, Cruveilhier[2] found the cerebral convolutions softened and dark red, and so much tumefied that they necessarily exerted a considerable pressure. In the progress of organic diseases of the brain, accompanied by paralysis, the supervention of serous accumulation in the cavities and on the surface gives rise to a compression, so that the limits of the paralytic symptoms do not continue as clearly defined as at the commencement. Hitherto these limits have not been indicated with that accuracy which is necessary; observers were content with mentioning that an entire limb was paralysed, without having any regard to the individual groups of muscles. Tanquerel's method of examining limbs affected with lead palsy, may in future serve as a model for these investigations.

The course of the medullary fibres from the spinal cord to the corona radiata and the hemisphere has hitherto only been shown in the roughest outlines, as followed with the naked eye in recent or hardened brains. The demonstration of different elements, and of their motor or sensory attributes, yet lacks much to render it at all satisfactory. We may expect some advancement in our knowledge of this subject by the dissection of the brains of subjects who have been paralysed for many years, and in whom the function of motion alone was impaired. An opportunity of this kind presented itself to me in the person of a girl, aged 19, who, according to her father's statement, had been born healthy, but was attacked with violent convulsions at the age of 3 months, followed by paralysis of the right ex-

---

[1] Clinique Médicale, vol. v, p. 464.

[2] Cruveilhier; Anat. Patholog., livr. xxxv, p. 6.

latter was converted into a thin strip, only a quarter the size of the right pyramid; at the same time the restiform bodies of both sides presented a normal volume, and the olivary body of the left side was even more arched and much fuller than that of the right. The dimensions of both hemispheres of the cerebellum were the same;[1] the brachial plexus of the right side was normal. We were not permitted to open the spinal canal. In this case the commissural structures were sound; but a tract that extended through various cerebral structures was atrophic owing to its not having been able to execute its functions. A few similar cases are recorded in Cruveilhier's 'Pathologie Anatomique' (Liv. viii), and in Carswell's 'Pathological Anatomy,' under the heading of Atrophy. (Plate iv, fig. 2.)

The attempt has often been made to discover detached foci of innervation in the brain, but it has invariably failed. Experiments upon living animals, which are effected only with great destruction of tissue, and surgical injuries accompanied by concussion, are of as little use in determining this point as complicated diseases of the brain. It is necessary to obtain a secure foundation, in order that the subject may not suffer under the stigma applied to phrenological mapping out of the brain. The examination of the brain of amaurotic individuals (see vol. I, p. 240) may serve to indicate the method to be pursued; we must seek to operate upon the centre from the surface. The following observation has been recorded by Lallemand[2] for a different purpose, but it is important in reference to the subject under consideration: A soldier, aged 38, had received a thrust with a lance in his right shoulder, in consequence of which a large aneurism of the axillary artery had formed. As a rupture threatened, a ligature was applied to the subclavia. As the ligature was tightened, the patient experienced a vivid pain in his neck. This diminished on the following day; warmth and sensation were restored in the arm. The pain returned on the fourth and fifth day; it became more violent on the seventh, and no relief was afforded by four bleedings. In the night preceding the eighth day the patient became deprived of consciousness, moved the legs restlessly (the arms being bandaged up), the pupils were immoveable, respiration became short and quick, and the pulse small and irregular. On the eighth day the head was bent backwards, and death ensued in the evening. The autopsy showed that the ligature had encircled those branches of the brachial plexus which pass off from the third cervical pair. The posterior lobe of the left hemisphere of the cerebrum presented a greenish hue at its surface; it was excessively softened within, and also of a greenish colour. In the middle there was an abscess extending to the lateral ventricle, from which above a tablespoonful of greenish pus was discharged. The cerebral tissue, to the extent of about two or three lines round the abscess, was injected and of increased consistency. This case appears to indicate that continued irritation of single peripheral nerves operates in a crucial direction upon a definite part of the brain, and there induces disorganisation. It served as an inducement to me to institute experiments upon living animals to establish if possible, as it were, a nervous injection from the circumference to the centre. On the 24th May, 1834, assisted by Dr. Henle, I tied the median nerve in the left axilla of a sheep affected with the staggers, and applied liquor potassæ to about half an inch of the nerve above the ligature, and it at once became brown. The animal gave a jerk, and by groaning and grunting showed that it felt the pain acutely; its respiration was very quick and irregular. The left fore leg was paralysed. On the 25th May its breathing was calmer; when stirred up with a stick, the animal rose up and stood upon three legs, the left foreleg dangling uselessly by its side. On the 26th of May paraplegia supervened, in walking and standing the weight of the body rested upon the left fore leg. Respiration was much accelerated and irregular, and death ensued at midday, forty-four hours after the experiment had been performed. The median nerve, which in part arose from the sixth and seventh cervical nerves, had lost its normal appearance and structure above the ligature; it was flattened so as to resemble a ribbon; was of a greyish red dirty colour, and softened. The dura mater of the spinal cord from the second dorsal nerve to the occipital foramen was uniformly red at its lower surface; on the upper surface this redness only showed itself in the interspace between the sixth and seventh cervical nerve. The texture and consistency of the spinal cord were normal, except that it was somewhat atrophied below the eighth cervical nerve, but this could not be set down to the experiment. The surfaces of both hemispheres of the cerebrum were covered with extravasated blood, especially along the course of the large vessels. The cerebral tissue itself of the right hemisphere appeared normal throughout. The left hemisphere was almost completely excavated and filled with the cyst of the cœnurus; the cerebral matter surrounding it was yellow and cribriform. The cranial bones presented a normal consistency, but on the left side, where the bone covered the hydatid, it was rather thicker than elsewhere.

---

[1] The brain is preserved in the Anatomical Museum of Berlin; it has been accurately delineated in the Inaugural Dissertation of Dr. Edward Henoch, De Atrophia Cerebri; Berol., 1842.

[2] Recherches Anatomico-Pathologiques sur l'Encéphale, &c., vol. i, p. 123.

A few more experiments were instituted upon nerves that are nearer the brain. On the 17th of July, 1839, Professor Gurlt had the kindness to lay open the infra-orbital nerve in a glandered but otherwise healthy horse. When this large branch was irritated, it produced great pain, and the animal kicked about, but there was no trace of reflex tension in any of the facial muscles. Extending the nerve by passing the bistoury under it caused no pain whatever. As it was supposed that the neurilemma might act as an isolating medium, and thus prevent the success of the experiment, it was repeatedly touched with acetic acid at the point of its exit from the bone, which caused it to assume a yellowish-brown colour. A brass wire was then put loosely round, and its point pushed into the nerve. The left half of the nose and upper lip were deprived of sensation. On the two following days the part was again touched with acetic acid. A brownish-red ichorous fluid ran out of the wound. The sensibility of the nerve was much augmented above the loose loop; so that the most trifling touch caused the animal to start, and turn away its head. The reaction was much less lower down. The horse was kept alive for a fortnight. No difference was perceived in eating between the right and left half of the upper lip, as Bell thought he had observed. In order to produce a more vigorous effect upon the nerve fibres, a solution of potash was applied several times. The animal was rapidly killed on the 1st of August, by blowing air into its veins. Professor Gurlt pass through the thalamus to the corpus striatum. It would be interesting to determine whether the different direction taken by the fibres radiated from the corona radiata exerts a greater influence. The fibres which emanate from its posterior margin enter the posterior lobe of the cerebrum, and it was here that in Lallemand's case the reaction produced by the application of the ligature to several nerves of the brachial plexus, was manifested. A case communicated by Rostan[1] also meets the conditions which we have laid down for such observations. An old woman, above 60 years of age, was affected with a paralysis of the right arm exclusively; it had occurred when she was 16 months old, in consequence of a fit of convulsions, and the limb was atrophied and shortened. Sensation was undisturbed; death ensued from a thoracic affection, and on examination only a rudiment of the posterior lobe of the left hemisphere was found remaining; it was entirely deficient above and externally, so that to the extent of about two inches the wall of the ventricle was visible under the arachnoid; the ventricular epithelium at this part was covered with a transparent false membrane; round about this extensive loss of substance the convolutions were small, corrugated, and atrophic. The ventricle contained a considerable quantity of serous fluid. The cerebellum and spinal cord were normal. The nerves of the paralysed arm were thicker than those of the healthy limb, and of a dark yellow colour. Andral, who is generally so accurate and trustworthy, gives a statistical resumé of the relations of the seat of the disorganisation to the seat of the paralysis; and it appears that among twenty-three cases of isolated paralysis of the arm, there were eleven presenting morbid changes in the corpus striatum and anterior lobe. But such a statement can avail little, when we are not even informed of the circumstances under which the paralysis occurred; nor is it unimportant that the names of the observers are withheld. Rostan[2] expressly states, as a well known fact that observations of this kind have been manufactured ad libitum; and he adds, with French politeness: "peut-être auraient-elles été communiquées à M. Serres,

---

[1] Recherches sur le Ramollissement du Cerveau, 2d ed., p. 256.

[2] Loc. cit., p. 251.

[illegible]

[illegible] atrophied, and half an inch smaller than the right one. An old apoplectic cyst, of the size of a cherry, was found near the surface of the posterior lobe of the left hemisphere; it was surrounded by indurated cerebral tissue, lined with a thin membrane, and contained some ochrey blood. There was a hardened spot of the size of a hazelnut, knotty, and of a brown colour, occupying the right corpus striatum and the adjoining medullary tissue; it looked as if a considerable time previously blood had been exuded into it, which had been partly absorbed, and had partly dried up and become interwoven with the cerebral tissue itself; I have repeatedly met with such a residue of former hemorrhages without any trace of a cyst. The trunks and smaller branches of the cerebral arteries were much incrusted so far as I followed them. The dura mater was firmly adherent to the cranium at numerous points. The arachnoid was thickened, covered with exudations along the falx, and adherent to the pia mater.

We possess various hypotheses relative to the determination of the central lesions affecting the nerves of the tongue; and much as they differ from one another they are supported by observations; in the majority of cases the observer has failed to distinguish the part which the brain plays in glossoplegia, as the organ of the mind, from the influence which it exerts as the source from which the fibres of the hypoglossus draw their origin. I select the following five instances, because they are as uncomplicated as possible, though I ascribe no further value to them than that of exciting attention. The first occurred in an aged female, who three years previously had suddenly lost her voice, without any disturbance of consciousness, motility, or sensibility. The movements of the tongue were entirely unfettered. Death was brought on by a disease of the heart. At the post-mortem, Andral[1] found a spot of softening of the size of a large pea near the posterior end of the left corpus striatum, and a similar spot in the right hemisphere at the union of the anterior and posterior halves, equidistant from both sides. Bright[2] has described two cases which so entirely correspond in the identity of their symptoms and their autopsies, that they may be compared to accurate physiological experiments. In both there was impeded articulation throughout the disease for several months; there was difficulty of deglutition, and repeated attacks of incomplete paralysis of the extremities had occurred; but the mental powers were unembarrassed. No morbid change was found in the brains, beyond softening in the two corpora striata, with some remains of sanguineous extravasation. The fourth and fifth cases occurred in the range of my own observation. A schoolmaster, aged 60, had been subject to paralysis of the inferior extremities for a year and a half, the sensibility not being at all affected. From the commencement he had suffered from impeded articulation; some time elapsed before he could pronounce a word, and then it was uttered with a sudden explosion, accompanied by a hissing sound. The stammering increased subsequently more and more, and at last became an unintelligible jumble of sounds, while the mental powers continued unimpaired. The locomotion of the tongue remained normal.

---

[1] Clinique Médicale, vol. v, p. 454.

[2] Reports of Medical Cases, vol. ii, pp. 296—301.

Professor Schlemm had the kindness to examine the brain. The only lesion found was a peculiar species of atrophy affecting the left corpus striatum, the preparation of which is still in my keeping. The medulla oblongata was healthy. We were not permitted to open the spinal column. The fifth case occurred in a watchmaker, aged 39, who having long been suffering from pulmonary tubercle, was brought home on the 24th Nov. 1824, speechless and motionless; having suddenly fallen down in this state, after exposing himself to a draught while covered with perspiration. I saw him soon after: the extremities of the right side were paralysed and deprived of sensation; the right eye was blinded, its pupil dilated, and though consciousness was unimpaired, the faculty of speech was entirely abolished. Under antiphlogistic treatment, the anæsthesia and the amaurosis disappeared during the following days, but the hemiplegia and speechlessness continued until death. Violent pains had also supervened in the right leg, and continued almost without intermission. The pulmonary disease made rapid progress, and the patient died on the 14th of February, 1825. At the autopsy the brain was found to be normal, with the exception of the left corpus striatum, which was purilaginous and of a brownish colour, interspersed with red spots. There were numerous tubercles and several excavations in both lungs, and the left ventricle of the heart was hypertrophied.

When single nervous tracts are paralysed, we very rarely have an opportunity of demonstrating a circumscribed lesion in the brain. For this reason, as well as on account of the character of the individual affected, the following case is not without interest. In the year 1834, while delivering a clinical lecture, Dupuytren was attacked with paralysis of the left facial nerve, and he had the courage to continue his discourse while he supported the left angle of the mouth with his finger. He had already on a previous occasion had a slight attack of vertigo, which subsequently returned during a journey in Italy. The left ala nasi continued collapsed until his death in 1835. His friend Cruveilhier, who examined the head after death, found a light yellow cicatrix on the inner surface of the right lateral ventricle behind the thalamus opticus, at the entrance to the posterior horn. A small cavity filled with brownish cellular tissue was found in the right corpus striatum, and another one of the same kind in the grey centre of the left corpus striatum.[1] This case also serves to confirm the fact, that a lesion confined to the grey substance is not followed by a loss of motility, as, with the exception of the one-sided facial paralysis, which is accounted for by the cicatrix in the opposite lateral ventricle, Dupuytren never suffered from any other paralytic affection.

We have already mentioned, that the paraplegic form of cerebral paralysis is one of extreme rarity. It would be of still less frequent occurrence, if the observers had been more chary in assuming paralysis, and had not included immobility from want of resolution, or irregular or imperfect movements owing to static disturbances, under the head of paralysis; on the other hand, cases in which conduction has really been destroyed in both halves of the trunk, are inadmissible, if the examination of the spine has been neglected. Disorganising processes and morbid growths in the medulla oblongata, in the adjoining cerebellum and pons, are often accompanied by more or less complete paraplegia, and this is also sometimes the case in coexistent or successive changes in the hemispheres of the cerebrum or cerebellum. It shows itself most frequently in chronic hydrocephalus, where it especially affects the lower extremities. Gölis[2] states, that when the child is put down on its feet and left unsupported, it instantly sinks down; when held on both sides it tries to move forwards, but the semi-paralysed foot drags heavily over the other, so that the calf of the former lies upon the tibia of the latter, and cannot be brought further forward.

---

[1] Cruveilhier: Anatomie Pathologique, livr. xx, p. 11.

[2] Gölis; Praktische Abhandlungen über die Vorzüglicheren Krankheiten des Kindlichen Alters; Wien, 1818, vol. ii, p. 43.

[illegible] the

[illegible] the most

[illegible] suited for

[illegible]

severe when attempts are made to extend the limb. These characters also appertain to the paralysis resulting from the consequences of inflammation, softening and induration. A few examples, taken from my casebooks, may serve as illustrations.

A man, aged 66, was seized in September 1835, with an apoplectic attack, in which the right side, and especially the arm, became paralysed; he recovered from this in a few weeks, excepting a slight residuary weakness of the upper extremity. The seizure was repeated in the beginning of November. The right eye was patent; the eyelid hung loosely over the left one, the left angle of the mouth was drawn down; the patient was unable to put out his tongue and to utter an articulate sound; the arm and foot of the right side were paralysed, and the muscles of the right arm contracted, so that the hand was bent upon the forearm and the latter upon the upper arm. Every attempt to extend the limb was followed by much pain; the patient often screamed out loudly from the pain in the paralysed limbs. Sopor and sloughing supervened, and on the 5th of December the patient died. At the post-mortem the left corpus striatum was found to present a brownish-yellow softening; its striated texture was entirely destroyed, and the anterior and a portion of the middle lobes of the left cerebral hemisphere were softened. A considerable quantity of sero-albuminous fluid was accumulated between the arachnoid and the pia mater of the cerebrum.

An old woman of 80 years of age, was affected with paralysis of the right arm and leg, following an apoplectic seizure which had occurred two years previously. The sensibility of the limbs as well as the reflex action was undisturbed. When the skin of the forearm was pinched the arm drew back, but the patient was unable to perform the movement with the strongest effort of the will. Whenever she took a deep inspiration, a rotatory movement of the paralysed upper arm took place, which was continued to the forearm. During the last half year the hemiplegia decreased, but the intellectual power was diminished. On the 11th May, 1834, the apoplectic seizure was repeated, causing complete paralysis of the right arm and leg. A new symptom was also manifested. The head was bent down to the shoulder in such a manner that I was unable to raise it from this position with any force that I could employ. Arti-

[illegible] diminished. [illegible] of the [illegible] and both inferior extremities refused to do their duty when she rose up; with the support of another person she managed to drag herself a few steps, and the feet in doing so were crossed as they are in hydrocephalic children. The treatment consisted in venesection, repeated cupping in the neck and derivation to the intestinal canal. Towards the end of the month the left arm showed a marked improvement in regard to motility and sensibility, and the patient was again able to raise it. The contraction of the fingers had ceased. On the 10th March, there was mental excitement; the muscles of the face twitched spasmodically, and the patient moved her arms restlessly. After a venesection had been made at the foot, the menses recurred copiously, but without exerting any beneficial influence. From this time a marked diminution in the intellectual powers manifested itself; the patient had a difficulty in collecting her thoughts, her speech was hesitating, she complained frequently of pains in the head and limbs, which were so intense at times, that she uttered loud screams. She began to talk wildly and confusedly, sometimes she knew those who surrounded her, at others, she did not recognise them. Repeated doses of morphia lulled her. The curious phenomenon which I have termed the echo, now manifested itself, and continued until shortly before death; the patient repeated the words spoken near her, without attaching any meaning to them. She would constantly repeat my questions addressed to her, "put out your tongue—raise your arm," without doing as she was bid. The delirium continued during the month of April, with intervals of quiet days, on which consciousness was less obscured. The paralysis and contraction advanced rapidly and were particularly marked in the left arm and right leg. When sitting up in bed the patient, even if supported, had a constant tendency to fall forwards. In the month of May, amaurosis of both eyes, with immobility of both pupils, which were moderately dilated, supervened. The psychical state alternated between lucidity and loud delirious talking. The paraplegia was complete, the contractions which had been confined to the fingers ceased during the last five days, and the fingers and arms could be extended without causing any pain. Calmness, memory, and consciousness returned. On the 25th May, death ensued with symptoms of pulmonary paralysis. Both hemispheres of the cerebrum

[illegible] and were inclos
the spots in the middle of t
there was an extravasation of blo
a thin serous fluid and a grumous
was varied from that of a pea
majority were round, some of an o
very numerous in the corpora
A woman, aged 28, formerly enjo
[illegible] her mental constitution,
[illegible] several years p
[illegible] She lost he
[illegible] and suspicious
[illegible] by day, s
[illegible] her chair. A
[illegible] periods, co
[illegible] and becam
[illegible] of Dec
[illegible] of the patien
[illegible] the s
[illegible] again. O
[illegible] The pati
[illegible] her head
[illegible] unable to
[illegible]

laborious, the left eyelid sunk, and the pulse became frequent. A venesection restored the patient to comparative health. A second violent attack occurred on the 19th February, 1839. The patient was found lying on her bed with her right side paralysed; the right eye was amaurotic, and the tongue immoveable. Consciousness became daily more obtuse; every question was answered by a monotonous "yes," and at last no response at all was given. In the limbs of both sides of the body immobility alternated with tremors and spasms, which during the last weeks of life became particularly violent at night, and also attacked the pectoral muscles. On the 11th March, the facial muscles were also attacked, the patient beginning to laugh violently upon the application of any stimulus, whether spoken to or whether she moved a limb. The fatal issue occurred on the 18th of May, preceded by coma. At the post-mortem, which was made on the following day, the central portion of the right cerebral hemisphere was found completely softened, and of a greyish-yellow colour. A similar but more extensive disorganisation was found in the left hemisphere, where it reached to the base and involved the thalamus opticus.

Doubts and objections have been raised to the doctrine that the symptoms of irritation may be associated with paralysis, depending upon softening of the brain, but this is owing to the different states of softening having been confounded by the nosologist as well as the pathological anatomist. I shall have occasion to revert to this subject more fully when treating of the formative diseases (Bildungskrankheiten) of the nervous systems; it may suffice to mention at present, that in one species of softening there is an exudation of coagulable matters, and the microscopic analysis conducted by Valentin, Gluge, and especially Bennet, has demonstrated the presence of exudation corpuscles, aggregations of granules, &c. In a not inconsiderable number of cases, minutely described, Bennet has invariably found symptoms of irritation, and more particularly contraction, associated with paralysis.[1] This inflammatory softening is very often associated with other disorganising processes of the brain, such as hemorrhagic cysts,

---

[1] Bennet; Pathological and Histological Researches on Inflammation of the Nervous Centres; Edinburgh, 1843, p. 78.

and in part also of the corpus striatum, all of which were converted into a creamy substance, which was easily taken up by the handle of the scalpel.

Tubercular tumours, which are most liable to occur in infancy, are commonly accompanied by convulsions, which either precede or coexist with the paralytic affection; and according to my own experience, more particularly when the cerebrum is the seat of the deposit. The most remarkable instance that has occurred to me, happened in a boy of 7 years, who was brought to me in 1836; from his infancy he had suffered from paralysis of the right arm and foot, the sensibility of the parts continuing unimpaired; he was subject to epileptic paroxysms, during which the paralytic and emaciated limbs were also seized with spasmodic twitchings, and he was likewise idiotic and deprived of the power of speech. An attack of meningitis proved fatal. An extensive sero-albuminous exudation was found between the arachnoid and pia mater of the left cerebral hemisphere. The brain itself was normal; its fibrous structure was so clear and well marked, owing to its firmness, that Professor Henle, who was kind enough to conduct the post-mortem examination, regretted that he could not make use of it for an anatomical demonstration. And for all that, there had been idiocy. However, on close examination the cause of the hemiplegia was discovered; in the middle of the left crus cerebri there were two encysted tubercles of the size of a thick pea, at a distance of a quarter of an inch from one another. This case shows how necessary it is to direct our attention to this important structure, which is traversed by all the great fibrous tracts passing to and from the cerebrum.

The degree and extent of the paralysis caused by compression, depends not only upon the capacity of the compressing medium, upon which generally most stress is laid; it is probable that the direction in which the pressure operates is a matter of still greater moment. This subject, which belongs to the yet unexplored field of the mechanism of cerebral action, might be partly elucidated by vivisections. Several accurate pathological observations prove, that upward pressure rarely induces paralysis, while it is commonly caused by pressure acting in the opposite direction. In proof of this we may point to tumours of the pituitary body, which sometimes attain such an extent as to displace the superincumbent parts, the lateral ventricles, the thalami optici and corpora striata. In the month of October, 1822, I was present at the post-mortem of a woman, aged 50, who for some time had been subject to amaurosis, fatuity, and during the last two months of her life, to epileptic seizures, which occurred especially at night. She had exhibited no trace of paralysis; a tumour of the size of a small apple was attached to the lamina cribrosa of the ethmoid bone and the sella turcica, and was so firmly adherent to them that it could only be partially removed. It weighed four ounces, and consisted of a cartilaginoid, yellowish tissue, traversed by white and bluish striæ. The pituitary gland and the chiasma of the optic nerves were not to be distinguished. The tumour had exerted such strong upward pressure, that the cavity of the ventricles was contracted to the size of a catheter. The anterior lobes surrounding it were extensively softened. The thalami optici and corpora striata were softened and flattened.

The cases given by Dr. Engel[1] in his work on the pituitary body and the infundibulum, corroborate this fact, and call to mind the circumstance that peripheral nerves passing over a tumour, and gradually stretched by it, suffer no interruption of their functions. We may also conclude from the experiments of Flourens,[2] that the effect produced by the tumour differs according as the pressure it exerts, acts in a vertical or a horizontal direction; longitudinal and transverse incisions were followed by different results; in the former case, however much the functions may have been disturbed, or even destroyed, they are restored; this never happens in the latter. Finally, in estimating the paralysing effect of pressure upon the brain, much depends upon the condition of the surrounding cerebral tissue. Inflammation and softening modify the paralysis, they may increase and even suddenly produce it; while on the other hand, the atrophy of the adjoining cerebral matter may cause the tumour to be long borne without any or but slight symptoms of paralysis.

Paralysis resulting from cerebral atrophy is congenital, or it is produced during the first year of existence, following an attack of convulsions and enduring through life. It may occur in the form of hemiplegia, and be complete or incomplete; in the latter case, the upper extremity is more paralysed than the lower. It is rarely confined to a single limb; sensibility is generally intact; contractions, especially of the flexors, are a common accompaniment. Atrophy of the paralysed parts is an invariable concomitant of the disease, and therefore pathognomonic; besides, it attains a degree unknown in any other form of paralysis. The extremities are wasted, and both shorter and thinner than the healthy limbs, and some of their parts are not perfectly developed. Not merely the cellular tissue and muscular fibres, but also the ligaments and bones take part in the atrophy. In persons thus afflicted, portions of the brain are found atrophied, or are altogether absent; the parts most frequently affected are the thalamus opticus, the corpus striatum, and the convolutions; it is unusual to find entire lobes atrophied. The colour and consistency is altered at the same time; the tissue is generally indurated, and of a yellowish tint. The empty space is filled with serum; not unfrequently the inner table of the cranial bones is thickened. Authors do not agree with regard to the condition in which they have found the nervous trunks of the paralysed extremities; some have observed them to be thickened, indurated, and of a yellowish colour, others describe them as presenting their normal appearance.

---

[1] Ueber den Hirnanhang und den Trichter; Wien, 1839.

[2] Recherches Expérimentales sur les Propriétés et les Fonctions du Système Nerveux dans les Animaux Vertébrés; Paris, 1842, 2d ed., p. 107.

Etymologically speaking, it is atrophy of the brain upon which the paralysis depends which has been observed to follow the application of a ligature to the carotis of the opposite side, during the first week after the operation, and continuing until death. In some cases softening and atrophy were found, in others there was no disorganisation in the brain. The encephalon of a female is preserved in the Berlin museum, in whom Graefe tied the left carotid; eight days after the operation, paralysis of the right side had supervened; the carotid was found obliterated as far as the circle of Willis, and the cerebral substance surrounding the left fossa sylvii, was converted into a bladder of water. In one of the cases accurately described by Dohlhoff[1] eight days after the ligature had been applied to the right carotid, paralysis of the left angle of the mouth, of the left arm and leg, and of the bladder, supervened. Death ensued on the twenty-third day after operation. At the post-mortem, the calibre of the right carotid was found reduced to one half of that of the left, and there was softening in the centrum ovale of the right hemisphere and of the corpus striatum. In the other patient, a female, paralysis of the left arm and leg occurred on the third day after tying the right carotid. Death took place on the fifth day. On opening the cranium, all the contents were found gorged with blood; there was no perceptible difference between the right and left hemisphere.

---

[1] Rust's Magazin für die gesammte Heilkunde, vol. xxxix, 1838, pp. 501—540.

Similar results were obtained in the experiments made by Sir Astley Cooper[1] upon living animals, in tying the vertebral arteries: only one or both forelegs were paralysed, according as only one or both arteries had become impermeable. The mere compression exerted by the finger produced similar effects.

There can be little doubt that impermeability of the cerebral arteries is a fruitful source of cerebral paralyses; but from attention having hitherto generally been diverted by other conditions ordinarily accompanying this morbid state, as hæmorrhage, hæmorrhagic cysts, softening or atrophy, we possess few instructive observations. Hasse[2] has recently published two cases of this kind with valuable commentaries. In the post-mortem details observers have only adverted to the incrustation and ossification of the arterial trunks and ramifications: they have neglected to attend to the obliteration of the ramifications resulting from stenosis or obliteration of the orifices of the vessels, which is of the utmost importance in a pathogenetic point of view; the vessels entering the corpora striata are both numerous and accessible to examination.

The opposite condition of congestion and hyperæmia of the brain has been so universally and readily admitted by medical men and the public, to be a cause of paralysis, that much prejudice has to be overcome before we can hope to arrive at a philosophical inquiry. I shall again advert to this matter when I discuss the general pathology of nervous diseases. Without laying much stress upon congestion at the surface of the brain under the existing relations of the circulation in the cranial cavity, we cannot deny that hyperæmia of the cerebral tissue, and especially when confined to a limited part, exerts a marked influence. Thus we often find a considerable circumscribed congestion, with small punctiform extravasations indicating the vicinity of an hæmorrhagic spot; it is not improbable that such a condition may recur several times, and be the cause of those evanescent attacks of paralyses which often accompany hypertrophy of the left ventricle of the heart.

---

[1] Guy's Hospital Reports, vol i. p. 463.

[2] Henle and Pfeufer's Zeitschrift fur rationelle Medicin, 1845. vol. iv. No. 1. p. 91.

We very rarely meet with cerebral paralysis of a regularly periodic type. Intermittent hemiplegia has been occasionally observed to accompany the febris comitata apoplectica[1].

Cerebral paralysis, like peripheral and spinal paralysis, is accompanied by disturbance of the antagonistic and symmetrical balance of the forces. We may expect that considerable progress will be made in our acquaintance with these phenomena, by the physiological observation of paralysis, for hitherto we have scarcely advanced beyond a knowledge of the facts that the action of the flexors predominates when the extensors fail to act, and that the face is drawn to the healthy side. I have already pointed out that the motor power, equally with sensibility, is in constant operation, even though we do not see or feel perpetual movement; this depends upon peculiar arresting agencies, among which the symmetry of balance is the chief. This function is in abeyance in hemiplegia, and abnormal positions and movements result. If the attack supervenes suddenly the individual falls over on the affected side; as the disease advances the patient in walking or standing inclines to the paralysed side; he is, as it were, pushed towards this side, and even in the horizontal position the body inclines that way. I have had repeated opportunities of convincing myself of this fact, and but very lately met with this phenomenon in an individual in whom cerebral softening had caused paralysis of the left arm and leg; when the nurse had previously placed him on his right side, the body turned to the left as soon as he went to sleep. A recent observer[2] has demonstrated that the rotatory movements in the direction of the longitudinal axis that occur in animals, in whom the crus cerebri or the optic thalamus has been divided on one side, are effected in a similar manner.

---

[1] Werlhof; Opera Medica, edit. Wichmann, p. 66. [Febris comitata apoplectica, a term employed by Professor Romberg to designate a class of malignant fevers first described by Torti, Morton, and Borsieri.]—Ed.

[2] Lafargue; Essai sur la valeur des localisations encéphaliques, sensoriales et locomotrices, proposées pour l'Homme et les Animaux supérieurs; Paris, 1838, p. 17.

There are some peculiar movements which I have only observed in individuals labouring under cerebral disease, but which I am unable to explain upon the principle of disturbance either in the antagonism or in the symmetrical balance. One occurs in old hemiplegic subjects, and especially in those resulting from cerebral hæmorrhage. In walking they advance with the healthy foot, which forms the fulcrum of the body, while the paralysed extremity, with the toes pointed downwards, performs circular or semicircular movements slowly, and with a sort of slide. The other is met with in hydrocephalic patients, before the supervention of complete immobility, and has been accurately described by Gölis:[1] the patient in walking always crosses one leg over the other, for instance he places the right foot invariably before the left one, and the latter again before the right foot; in doing this the front of the foot is turned inwards, the individual generally stepping upon his toes, and but rarely upon the external margin of the entire sole. The large toe of one foot strikes against the Achilles-tendon of the other.

The consecutive changes produced in the hard and soft parts of the paralysed extremities in consequence of the immobility are the same in cerebral as in spinal paralysis. Persistent contraction of the flexors is more frequent in this case, and should not be confounded with the transitory and painful contractions of the muscles in inflammatory softening; this contracted state sometimes gives rise to stiffness, and even to anchylosis and consequent deformity of the joints; when this takes place emaciation ensues more rapidly and in a more eminent degree.

In our treatment we should always have regard to this secondary effect; the more so as it may have become isolated by arrest of the cerebral disease, and may be perpetuated as an independent affection.

The other rules applicable to the treatment of the cerebral affection upon which paralysis depends will be considered under the head of the formative diseases of the nervous apparatuses; I may however allude to the influence exerted by the spontaneous cure of hæmorrhage and softening of the brain, upon the cure of paralysis. The analysis of my own observations and those of other writers has convinced me that this process bears no direct relation to the recovery from paralysis. In thirty-four cases that I have collected, the paralysis was found to have disappeared in ten, in six it was diminishing, and in eighteen it continued unchanged up to the period of death, although in several of those belonging to the last category, the cavity had closed, and was almost cicatrised. The condition of the surrounding cerebral layers is of more consequence than the size of the cavity; in the cases of complete recovery they presented a normal texture; but where there was even a trifling residue, a cartilaginous induration of the adjoining parts appeared to have maintained the paralysis unaltered; in one of my cases it had done so for five, in another for ten years. It has not been determined whether the seat and direction of the hæmorrhagic cysts exert any influence, but it is probable that they do so.

---

[1] Practische Abhandlung über die vorzüglichsten Krankheiten des kindlichen Alters, vol. ii. p. 42.

Paralysis, the diminution or loss of motor conduction in the central fibres of the brain, must be distinguished from the diminution of the force which regulates the co-ordination of the movements, that force which appertains to the brain as a central organ. This affection is characterised by a loss of balance, and of the due harmony and succession of the muscular contractions necessary to effect movements. In man the expression of these phenomena is more manifestly rendered in the inferior than in the superior extremities. The individual is unable to stand erect or to walk in a straight line; his gait is rolling, even when the body is supported by others. In ordinary walking, the support of the body and the pendular movements of the lower extremities are two elements which are essential to progression; the rhythmical action of the feet is impaired in the cases under consideration; owing to the interruption of the pendular movement, or of the curling off of the foot from the ground, we must ascribe the frequent tottering and stumbling of the affected individual (titubatio). By this [illegible] throughout the community [illegible] which some inside persons [illegible] must frequently found [illegible] movements [illegible] same way as in the animals in which Flourens removed the cerebral lobes.

Independently of this we meet with a peculiar species of paralysis in insane persons, which manifests itself in the articulating movements of the tongue and lower extremities. Esquirol[1] was the first to direct attention to the subject; his pupil Calmeil[2] has written the best monograph upon it, and it has also been studied by Bayle[3] and Parchappe.[4]

This form of paralysis commences with a difficulty of speech. Articulation is no longer clear; the insane person is forced to make an effort in order to speak; the words fail him; he talks thick, like a drunken person, but the movements of the tongue and the lips are in no way deranged. When the individual is excited his speech is rendered more fluent than it is in calm moments. The inferior extremities become weak, and their movements exhibit an absence of coordination. The gait becomes tottering and insecure, especially when the patient is walking slowly. When he wishes to walk from one place to another, he is obliged to give himself an impulse repeatedly, which renders his mode of progression the more peculiar. When complicated movements, such as climbing or jumping are attempted, the exertions made to achieve them bear no relation to the result attained. When the patient has fairly commenced to advance, he can accelerate his movements, and even run; when lying in bed, so that the trunk is supported, he has no difficulty in moving his feet. As the disease advances articulation becomes still more limited and very indistinct, it is almost necessary to guess the words; the legs are almost deprived of their power to support the body. When the insane person rises from his chair and walks, he rests his hands upon the back of his chair, raises himself up slowly, and, like a child that is measuring its first steps, bends to the right and bends to the left, then makes an attempt and drags himself down along in a zigzag direction. He stumbles over the most trifling impediment, and is constantly tumbling down.

---

[1] Les Passions considérées comme Causes, Symptomes et Moyens curatifs de l'Aliénation Mentale; Paris, 1805.

[2] De la Paralysie considérée chez les Aliénés; Paris, 1826.

[3] Traité des Maladies du Cerveau et de ses Membranes. Maladies Mentales. Paris, 1826.

[4] Recherches sur l'Encéphale, sa Structure, ses Fonctions, et ses Maladies, Deuxième Mémoire; Paris, 1838, pp. 141—176.—See also Esquirol; Des Maladies Mentales; Paris, 1838, vol. ii, pp. 263—282.

The sense of weakness and disturbed balance is so great that the patient seeks to hold on to the nearest object. The upper extremities also begin to participate; there is much helplessness, and the hands can only with difficulty be raised up to the head. The cervical muscles and the muscles of the neck lose their power: the chin sinks upon the chest; the sphincters are paralysed. When the disease has attained its highest point, the patient cannot articulate at all, and movements become impossible, even when the body is supported. Mastication and deglutition are impeded; the morsel sticks in the throat. Convulsions of a local or general character, and epileptic attacks frequently supervene upon this paralytic condition, and especially towards the close of the disease. Sensibility is rarely affected to the same extent as motility; the numbness or loss of sensation appears to depend less upon the incapability of conduction than upon an impaired perceptive power. The relation in which insanity and paralysis stand to one another varies. Both mania and monomania enter into combination with it, and they do so more commonly in the advanced stages than at the commencement of the disease. The delusion very often refers to the possession of enormous wealth, of high places of distinction, and luxurious objects, though, as Bayle has demonstrated, by no means exclusively. Paralysis rarely associates itself with monomania of a negative character, or melancholia; it is most frequently complicated with dementia, which either presents features of oblivionsness and incoherence of thought, and the entire absence of mental combination; or forms the termination of mania in a complete ruin of the psychical powers. The influence of maniacal excitement, which may break out in the most utter idiocy, upon the paralytic phenomena, is remarkable; during such attacks speech becomes fluent, and the gait rapid. It is only during the last period of existence that the maniacal expression is confined to screaming and a violent movement of the extremities.

The duration of the disease extends from one to three, and in solitary cases, from five to six years. It almost invariably terminates in death, either suddenly, by apoplectic or epileptic seisures, or more frequently, by gradual exhaustion from diarrhœa, dropsy, or marasmus.

Several French physicians lay great stress upon a softening of the superficial layers of the grey matter of the cerebrum, which is one of the post-mortem appearances met with in connection with dementia; it generally occurs in complication with adhesions of the pia mater, so that when this membrane is detached the cortical substance adheres to it in patches, causing the surface of the brain to present a more or less eroded or granular appearance. Even when there are no adhesions, this softening may be shown to exist within the grey substance. Calmeil's[1] investigations have shown, that beyond an accumulation of serous fluid, that varies in amount, no marked alterations are found in the spinal canal.

The male sex is more predisposed to this form of paralysis than the female; this is well shown in Paris, in comparing the male lunatic asylum of Bicètre with the one for females at the Salpetrière. Calmeil states the proportion to be among the male insane as 1 to 15, among the females as 1 to 50. The predisposition is greatest between the 30th and 50th years of life. Persons of robust constitutions are more exposed to it than delicate individuals. Climate appears to exert some influence upon the disease; it is less frequent in the south than in the north. Esquirol met with very few paralytic subjects in the Italian madhouses. This complication appears more common in France, than either in Germany or in England. The wealthy are more subject to it than the poor, the higher orders of society more than the lower, and those ranks, *e. g.* in the army, in which there is much room for the play of ambition, and where there is great temptation to debauchery, are peculiarly prone to it. Venereal excesses and intemperance frequently give rise to the affection.

This form of paralysis clearly proves the great importance of an accurate knowledge of disease, to enable us to give a prognosis. The condition of a lunatic, his age, the short duration of the insanity, may excite very strong hopes of his recovery; but if we find a retardation of the articulating

---

[1] Loc. cit., p. 371.

END OF VOL. I

INDEX.

Accessory of Willis, spasm of, i, 316.
Accubitus, note, ii, 264.
Acineses, ii, 237; etymology of, note, i, 275.
Acoustic hyperæsthesia, i, 118.
Algor, i, 89.
Amaurosis, i, 232.
Amblyopia, i, 232.
Anæsthesia, i, 192; anæsthesia dolorosa, i, 194; of the trigeminus, i, 211; peripheral, i, 213; centric, i, 223; of the muscular nerves, i, 225; of the vagus, i, 228; of the acoustic nerves, i, 224; of the brain, i, 272; olfactory, i, 249; of the spinal cord, i, 265; of the sympathetic, i, 264; A. gustatoria, i, 252; A. saturnina, i, 270.
Anecdote of Dr. Herz, i, 187.
Angina pectoris, i, 124.
Animal baths, note, i, 210.
Antiperistaltic spasm, ii, 23.
Anus, spasm of, ii, 25; paralysis of, ii, 348.
Anxietas tibiarum, i, 91.
Aphonia in cholera, ii, 333.
Aqua antihysterica Pragensis, note, i, 336.
Ardor, i, 89.
Arsenic, in Neuralgia, i, 54; in Chorea, i, 73; a cause of paralysis, ii, 369.
Arteritis, a cause of acinesis, ii, 238.
Asthma, i, 331.
Atrophy of optic nerves in amaurosis, i, 241.

Balsamus vitæ Hofmanni, note, i, 106.
Bitter water, note, i, 102.
Blepharospasmus, i, 291.
Bolus alba, note, i, 88.
Brachial plexus, neuralgia of, i, 80.
Brain, sensibility of, i, 158; hemorrhage into, i, 169; inflammation of, ii, 429; tubercle of, ii, 436.
Bulimia, i, 106.
Bullæ, preceding Spedalskhed, i, 266.

Carbonate of iron in neuralgia, i, 53; in sneezing, i, 348; in pertussis, i, 356.
Carbonic acid gas in ciliary neuralgia, i, 58.
Cardiac plexus, hyperæsthesia of, i, 124; cardiac spasm, ii, 1; cardiac paralysis, ii, 339.
Caput obstipum, i, 319.
Carlsbad, note, ii, 225.
Carotids, compression of, in rhythmic spasm of the face, i, 287; in epilepsy, ii, 223; effect of ligature of, on the brain, ii, 438.
Carpopedal contractions, i, 328.
Cephalalgia, i, 158.
Cerebral neuralgia, i, 176; cerebral spasms, ii, 155; cerebral paralysis, ii, 402.
Cervical neuralgia, i, 81.
Chickenbreast, its cause, ii, 328.
Chorea, ii, 53.
Clubfoot, i, 325.
Cœliac neuralgia, i, 128.
Coffee in asthma, i, 340.
Colica saturnina, i, 132.
Colic, ii, 21, ii, 382.
Compression of nerves in neuralgia, i, 53.
Conduction of sensation, i, 4.
Conium in neuralgia, i, 53.
Convulsio cerealis, ii, 45.
Coordinated spasms, ii, 167.
Coordination, loss of the power of, ii, 442.
Coxalgia, i, 74.
Cremaster, reflex action of, i, 285.
Croton oil in neuralgia, i, 54; in lead colic, i, 139.
Croup distinct from spasm of glottis, i, 333.
Crural neuralgia, i, 171.

---

[1] The Original contains no Index, the Editor therefore is alone answerable for the one appended to the English edition.

[illegible] vesical affection, ii.
[illegible] toxica, ii.
[illegible] ii. 187;
[illegible] 89.
[illegible] 89
[illegible] 180.

Lead palsy, ii, 365.
Lead poisoning, i, 132, 269.
Liquor cornu cervi, note, i, 336.
Lockjaw, open and closed alternating, i, 300.

Marienbad, note, ii, 225.
Masticatory spasm, i, 299; ii, 287.
Mastodynia neuralgica, i, 83.
Measles, their relation to hooping cough, i, 354.
Mesenteric neuralgia, i, 129.
Morphia, endermic application of, i, 71.
Muscular sense distinct from sense of touch, i, 226.
Myelitis, i, 150.

Nenndorf, note, ii, 265.
Neuralgia, i, 18; cutaneous, i, 18; facial, i, 31; ciliary, i, 56; lumbo-sacral, i, 59; brachial, i, 80; cerebral, i, 176; obturator, i, 75; otic, i, 121; of vagus, ii, 312.
Neuritis, i, 63, 66.
Neuroma, i, 27; case of, i, 204.
Neuroses of sensibility, i, 1 to 273; of motility, i, 275, and vol. ii.
Norwegian leprosy, see Spedalskhed.
Nyctalopia, i, 242.
Nystagmus, i, 306.

Obturator nerve, neuralgia of, i, 75.
Olfactory hyperæsthesia, i, 121.
Optic anæsthesia, i, 232.
Optic nerve, hyperæsthesia of, i, 111.
Osteomalacia, i, 150.
Otic neuralgia, i, 121.

Paralysis, ii, 237; agitans, ii, 233; of the facial nerve, ii, 267; of the third division of the fifth nerve, ii, 287; of the nerves of the eye, ii, 290; of the hypoglossus, ii, 302; of the nerves of respiration and vocalisation, ii, 312; of the spinal nerves of respiration, ii, 325; of the vocal nerves, ii, 331; of the sympathetic, ii, 32; of the cardiac nerves, ii, 339; of the nerves of the alimentary canal, ii, 345; of the bladder, ii, 349; paralysis saturnina, ii, 365; hysterical, ii, 392; reflex, ii, 376; intermittent, ii, 440; cerebral, ii, 402; of insanity, ii, 444.
Pertussis, i, 349.
Phthisis bronchialis, ii, 314.
Pituitary body diseased in anosmia, i, 249; enlargement of, ii, 436.
Pleurodynia neuralgica, i, 153.
Polydipsia, i, 106.
Probang, use of, in dysphagia, ii, 12.
Prostration without reaction, ii, 336.
Pruritus, i, 86.
Psychical hyperæsthesia, i, 178; psychical anæsthesia, i, 272; psychical spasms, ii, 178.
Pyrmont, note, ii, 95.

Ranunculus considered by Dioscorides a cause of intoxication, i, 294.
Reflex action of cremaster, i, 285; reflex irritation causes trismus, i, 302; strabismus, i, 310; reflex spasms, ii, 77; reflex paralysis, ii, 376.
Respiration, its effect upon the cerebral circulation, i, 159; paralysis of, ii, 312.
Retina, congestion of, i, 115.
Rheumatic tetanus, ii, 126.
Risus caninus, i, 292; R. convulsivus, i, 357.
Roaring in horses resulting from paralysis of the recurrent nerve, ii, 320.
Rumination, ii, 14.

Sapo stibiatus, ii, 226.
St. Vitus' dance, ii, 53.
Schmier and Hungerkur, note, i, 175.
Sciatica, i, 59; sympathetic sciatica, i, 62.
Sea sickness, ii, 18.
Secale cornutum, effects of, ii, 45.
Singultus, i, 342.
Sneezing, i, 347.
Softening of the brain, symptoms of, i, 165.
Spasms, i, 279; pain in, i, 283; relation to intellect, i, 284; etiology of, i, 285; rhythmic, i, 187; in upper extremities, i, 320; in lower extremities, i, 325; of the nerves of respiration, i, 330; of the glottis, i, 331; of bronchi, i, 337; vocal, i, 362; of cardiac nerves, ii, 1; of intestinal nerves, ii, 9; of pharynx and œsophagus, ii, 11; of the stomach, ii, 16; of the bladder, ii, 27; of the sexual muscles, ii, 33; of the spinal cord, ii, 42; reflex, ii, 77; from excitement of the brain, ii, 153.
Spasmodic contraction of hip, i, 325.
Spasmodic laugh, i, 357.
Spectra, i, 116.
Spedalskhed, i, 206, 266; Post-mortem appearances in, i, 268.
Spermatic neuralgia, i, 144.
Spinal irritation, i, 152.
Spinal meningitis, ii, 50; spinal paralysis, ii, 354.
Spinal neuralgia, i, 148.
Stahl's pills, note, ii, 7.
Stammering, i, 362; distinguished from stuttering, i, 363.
Static spasms, ii, 156.

R

To avoid fine, this book should be returned on
or before the date last stamped below

TRANSFERRED TO LANE
LIBRARY FROM ANATOMY

ANATOMY

22048 1

LANE LIBRARY, STANFORD

BOUND BY
WESTLEYS
& Co
LONDON